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The Edward Stirling Lectures.[1]

LECTURE II.

PRINCIPLES OF THE SURGERY OF THE SKIN.

By KENNETH W. STARR,
Sydney.

A RECENT reviewer of a fashionable surgical text-book expressed the opinion in the *British Medical Journal* that it was high time that a text-book of surgery should be written by a surgeon who had never read a surgical text-book. I take it that this proviso was designed to exclude cant and traditional errors.

The surgery of the skin will find, I trust, a place in such a text-book; in fact, because of its importance to the well-being of the human body, it might even be accorded a prominent place in that publication. This may appear overweening and perhaps a little radical, and, were he alive, Sir Edward Stirling might not approve of such an attitude. I would be able to remind him, however, of his own sweeping and radical review of the surgery of hydatid cysts and his clarification of the problems of drainage in relation to their treatment which he expounded before an Australasian surgical congress more than forty years ago. I would be justified, too, in the comment that his contentions have been sustained by the experience of posterity. It can only be hoped that a similar happy fate awaits these proposals also.

Functions of the Skin.

From the surgical viewpoint the true functions of the skin are not obvious until considerable areas of it have been lost, and we all know that when this has occurred the patient is in dire peril of his life. The ectodermal layer has been developed primarily to protect the body against trauma (physical, chemical or bacterial) and the impermeability of the skin is considerably increased by the underlying fat. It is, in addition, an organ of secretion, important in thermo-regulation, and its sensory functions are well known. The vital function of preventing the loss of the interstitial fluid of the body is taken for granted, but it becomes increasingly prominent where skin has been lost, and if this loss is extensive, prodigious quantities of serous fluid may escape. The serious clinical complications of dehydration then become manifest.

Relevant Anatomy of the Skin.

The skin of the body surface is thrown into numerous ridges and furrows which vary in regularity, disposition and size. Their anatomical arrangement depends on the fibrous bundles and the elastic fibres of the corium, on the direction of movement to which the subjacent parts are subjected, and on the attachments of the skin to the deeper structures. The furrows are coarse over the joints, but fine and regular (the so-called "lines of cleavage") elsewhere on the body.

The epidermis and its appendages are ectodermal; the fibrous corium and underlying fat are mesodermal. The germinal layer of the epidermis is the deeper Malpighian layer and it abuts on the underlying corium as a series of well-marked papillæ.

The corium carrying the blood vessels and nerves for the epidermis is composed of white and yellow elastic fibres. It is disposed in three layers, the papillary being most superficial for the nourishment of the epidermis, intercalating with the papillary Malpighian layer as a vascular and sensory organ. In this zone the white fibre bundles are mainly vertically disposed. The intermediate or reticular zone is composed of numerous thick decussating

[1] Delivered on May 31 and June 2, 1949, at Adelaide.

white fibre bundles disposed horizontally, the long axis of the meshes being determined by the direction of greater skin tension. Many elastic fibres are also found here. The deepest zone is the fatty subcutaneous zone, the so-called *panniculus adiposus*.

It is of interest that the elastic fibres do not regenerate after rupture, necrosis or inflammation, and the white fibre bundles which do regenerate are coarser and less clearly disposed than the normal.

Wounds without Skin Loss.

The surgical application of these facts is determined by the degree of skin loss. In the first instance, where the loss is small or negligible, disfigurement and disability can be avoided if the surgical principles underlying correct wound management are well known.

Wound Healing.

In the absence of sepsis a wound will heal by first intention, with a minimum of scarring, if the edges are correctly apposed and if they are supplied with blood of adequate quality and quantity.

The quality of the blood depends on the state of the body nutrition and we are all familiar with the indifferent fashion in which the healing of wounds occurs in cachectic patients suffering with avitaminosis or hypoproteinanæmia. This will cause no wonder when the prodigious quantities of nitrogen, sulphur and vitamins required for wound healing are examined. It is important that blood loss through hæmorrhage or chronic sepsis should be restored.

The quantity of the blood is diminished by arterial disease, by lack of immobilization, in the aged, and in those cases in which œdema or tension have restricted the local circulation.

The products of the reparative process are dissolved by the process of suppuration.

Therefore in a healthy individual neat healing may be anticipated provided that the wound is not placed across the lines of skin tension, and the patient does not suffer from that diathesis which results in keloid formation.

Disfigurement may result from wide scars or from keloid; while disability may result if the cicatrix interferes with the movement of joints. Wide scars are the heritage of inaccurate wound apposition. It is important in this regard to realize that if an æsthetic scar is to eventuate, all layers of the corium must be accurately apposed so that tension on the epidermal layer can be avoided. To avoid traumatic swelling, the use of all coarse instruments on the skin edge must be eschewed, and fine forceps and hooks must take precedence over the more widely used but coarser instruments.

Suture Materials.

Suture materials vary in the degree of fibrosis which they promote in the corium and in the majority of cases an increasing reaction follows the use of these materials respectively: Tantalum wire, stainless steel wire, nylon, silk, cotton, catgut. Catgut dissolves at an early stage of wound repair and accounts for many of the wide scars which one so frequently encounters. In using silk or cotton one must follow the dictates of Halstead, enumerated fifty years ago. These may be summarized thus: The suture must be very fine, employed in interrupted fashion, cut on the knot, not mixed with catgut in the wound, and not allowed to cross a cavity.

Wire and nylon are very difficult to use owing to their tendency to slip (and in the case of the former to kink), but when employed in interrupted fashion in the corium, they are ideal sutures for the apposition of the skin, particularly if disposed with the knot on the deep side to prevent its ulceration through the overlying epidermis.

Keloids.

Keloids are common in children, in the very fair, and in very dark adults. They are an unpleasant complication of scars, resulting in disfigurement, irritation, ulceration and even malignant disease. Their cause is not really known. They are more common when the incision crosses the lines of skin tension, when the wound involves the intermediate corium, when catgut sutures are employed and in areas which are thickly covered with lanugo hairs. Keloid is often a clinical diagnosis and not infrequently the pathological report on the lesion is fibrosarcoma, a frightening but incorrect appreciation of its clinical nature. The treatment of keloids is often accomplished by irradiation, but the best results ensue from their prevention. If a patient is a known keloid former, minimum scarring can be produced by employing wire sutures in the corium, and while the skin stitches are still *in situ* superficial X-ray therapy is employed.

Wounds with Skin Loss.

Where the skin loss has been appreciable it may be necessary to cover the recipient defect with an appropriate form of skin graft from a suitable donor site. This is the only fashion in which healing by first intention may be secured in such cases and has led to the aphorism that the best dressing for open wounds is skin. In all other instances healing by second intention is to be expected.

It is unwise to undertake any grafting procedure until due consideration has been accorded to the following points: (*a*) the recipient defect, (*b*) the donor site or sites, (*c*) ancillary measures to ensure "take" of the graft, (*d*) knowledge of the clinical features of success and failure.

The Recipient Defect.

The Area of the Defect.—With small defects donor sites will be readily available to supply skin from autogenous sources. On the other hand in widespread burns insufficient donor sites may be available, in which case heterogenous skin must be employed. Permanent "take" of such skin should not be expected, and after three weeks exfoliation as a rule occurs, except in homologous twins.

The Depth of Skin Loss.—Only loss of the full thickness of the skin will require grafting. Such loss may have been produced by the original injury, but can also occur as the result of coagulation therapy injudiciously applied to an area of superficial loss and subsequently complicated by infection. In superficial lesions, epithelial regeneration occurs from epithelial elements of the epidermis and from the lining of the sweat and sebaceous ducts and the hair follicles. Therefore, if these have been destroyed, skin grafting will be required. In areas of intermediate loss, where the sweat duct and hair follicle elements alone remain, the skin regeneration will be very slow and may require about three weeks before healing assisted by ingrowth from the edges has been secured. It is important, therefore, from the point of view of prognosis and the therapy to be employed, that the depth of skin loss should be recognized.

The clinical features of superficial loss are those of the exposed superficial dermis and are actually quite familiar, although not appreciated. The wound has a pink base, which is studded with multiple minute red dots (representing the blood vessels), and is sensitive to pressure and touch with a probe. When the deeper dermis is exposed, however, it has a white floor and the red dots are coarse, fewer in number and more widely spaced. The floor is often insensitive to touch with a probe. Such areas never require skin graft, unless abused by trauma or infection. Loss of the whole thickness of the skin results in a slough or eschar which, like all gangrenous areas, is exfoliated at a line of inflammation and suppuration revealing upon separation a granulating area underlying it.

The Blood Supply and Pathological State of the Defect.—Skin loss may require grafting immediately. In this case a free skin graft will "take" on any areolar or muscular base, provided that infection and hæmatoma are absent. It will not "take" on bare bone, bare cartilage, bare tendon, bare arteries, nerves or joint capsules. If these last-mentioned structures are present in the subjacent wound, a pedicle flap is required to cover them. Unless the wound is covered immediately, or if a slough has had to be

separated, granulation tissue associated with infection will be present in the floor of the wound.

Granulation Tissue.—Granulation tissue histologically presents two well-defined layers, a deeper, in which vessels and fibroblasts are horizontal, and a superficial, in which the more primitive vessels and cells are vertical. When infection has been present for about three weeks, the deeper layers undergo fibrosis and strangulate the fine vessels of the vertical zone, producing chronic granulation tissue, which is pale and œdematous. Many varieties of granulation tissue may present in the floor of any open infected wound, but they are as a rule variations of three basic varieties: (i) Healthy granulation tissue is pink, flat, painless to dress, has no sloughs or purulent discharge, and reveals no streptococci or *Bacillus pyocyaneus* on culture. (ii) Infected granulation tissue is red, œdematous, painful, covered by small sloughs, discharges pus, reveals many organisms on culture and may be associated with cellulitis of the surrounding skin and regional lymphadenitis. (iii) Proudflesh is pale, œdematous, painful (often exquisitely) revealing many organisms on culture, and showing sloughs and pus continuously or intermittently.

Skin grafts will take only on healthy granulation tissue, other measures first being necessary in the other types of wound.

The Donor Site.

Free split skin grafts traverse the corium of the donor site and can be cut from any free surface.

When large areas of graft are required any free skin surface may be used. When smaller areas are necessary the taking of a graft should not be permitted to cause disability or disfigurement, a very frequent complication in children. All grafts in children should be taken from the groins and buttock if possible, and not from exposed surfaces unless large areas are required to compensate for widespread loss of skin.

The safest grafts are the least cosmetic, namely, pinch grafts and very thin split skin grafts. The best cosmetic result is obtained from a flap, but excellent cosmetic results may also be obtained from full thickness or Wolff grafts. However, it is very difficult to obtain a good "take" with these types of graft. Split skin grafts are intermediate in thickness and cosmetic result. Donor sites from which pinch grafts have been taken are disfiguring and, therefore, these should not be taken from exposed sites if it can be avoided. Split skin grafts may be cut from any flat surface. Unless the surface is completely flat a wide graft cannot be obtained. The inner part of the arm, deltoid region, antero-medial or postero-lateral aspects of the thigh are ideal from this point of view. If large areas of skin are required grafts may have to be cut from curved surfaces and in these circumstances special measures are necessary.

It is not generally known that a razor is an indifferent instrument for cutting a graft. It is smooth and sharp and readily traverses the skin. A skin-grafting razor is sharp but rough and remains in the donor layer of the skin without difficulty. Improvements in the skin-grafting razor, such as the Humby or Merck pattern, have an adjustable roller guide in front of the blade which enables grafts of varying thickness to be obtained and which maintains a flat surface immediately in front of the blade, facilitating cutting. The secret of obtaining a successful graft is to ensure a flat skin surface and to cut slowly and steadily with a sharp knife, maintaining pressure on the back of the blade with the index finger.

If the floor of the wound contains structures which are avascular (and will therefore not sustain a graft), a pedicle flap must be designed from the tissue immediately adjacent to the wound and any resulting secondary defect in the donor site may then be covered with a split skin graft. Such a flap may be designed to act in a transposition, bridge, or rotation fashion. If such flaps are not possible a remote pedicle flap, such as crossleg or crossarm flap, may be required. It should be pointed out that such flaps have a meagre or independent blood supply, which is often inadequate to deal with any pre-existing infection, and control of infection is indispensable to success.

When grafts are required from curved surfaces of the body two possible solutions present themselves: (*a*) to employ the dermatome, an instrument which lifts the skin by the use of glue on to its component drum and cuts the graft when the blade rotates; (*b*) to render the skin level by the intradermal injection of a considerable quantity of normal saline or by the use of a frame with which to stretch the intervening skin.

Ancillary Measures to Ensure "Take" of the Graft.

Chemotherapy.—To avoid infection in these cases it is necessary to employ appropriate chemotherapy locally and generally. Of the substances for local use against the commoner organisms the most satisfactory in my experience are the following:

Streptococcus: Penicillin, about 500 units per millilitre.
Bacillus pyocyaneus: Acetic acid, 2·5% solution, or streptomycin.
Staphylococcus: Penicillin, 2500 to 5000 units per millilitre.
Bacillus coli communis: "Monacrin", one in 1000 solution for four days; streptomycin, 0·3 gramme daily.

These are employed by intermittent infusion as described with the pressure dressing. The use of penicillin by parenteral injection is imperative.

Where skin loss is extensive and affects an area which is unsuitable for the application of pressure dressings, such as the chest and neck, the removal of sloughs and discharge may be effected by the mechanical cleansing of the wound with saline or soapy baths. Such baths are very comforting to the patient, but are liable to accelerate the onset of anæmia, and careful watch must be kept on the blood count with a view to early blood transfusion. The baths are particularly liable to result in secondary infection of granulations if other patients are using them (for instance, in wards and hospital). Further, the solutions employed must be isotonic if the best results are to be achieved, so that effective employment of baths in serious cases is best undertaken in special units designed for the purpose.

Scraping of Granulations.—In dealing with proudflesh, control of infection is often disheartening, and if no success is obtained in the first week the granulations should be scraped gently to expose the underlying horizontal fibroblastic layer of the granulation tissue. Grafts will take on this layer if special attention is paid to the two items mentioned hereunder, human glue and pressure dressings, and to the control of post-operative infection by local chemotherapy.

Human Glue.—The formation of fibrin under a graft often occurs while the graft is being fixed in position, and if care is taken to avoid disturbance of the graft (with consequent rupture of the delicate fibrin fibrils), no difficulty will be encountered in obtaining 'take" of the graft. Moreover, since hæmatoma formation is fatal to a graft, hæmostasis is of the greatest consequence. To achieve fibrin formation and hæmostasis, thrombin solution or thrombokinase ("Thrombo-Plastin", Commonwealth Serum Laboratories) should be injected under the graft with a syringe after the graft has been sutured into position and while the pressure dressing is being applied.

The Pressure Dressing.—The graft should be sutured into position with its edges overlapping the edges of the recipient defect, except where a full thickness graft or flap is being sutured accurately edge to edge. All blood clot is expressed and a pressure dressing applied. This pressure dressing is based on a layer of "Vaseline" gauze or *tulle gras* against the graft, a wide layer of fluffed wool moistened with saline solution to provide a resiliency, and a retaining *crêpe* bandage. Gentle pressure is imperative for the "take" of grafts. Granulating areas which are being prepared for graft must also be subjected to pressure to flatten them, and if chemotherapy is to be employed a tube may be laid down through the pressure dressing to the "Vaseline" gauze layer.

When the skin loss is so extensive that saline baths are indicated, the pressure dressing, with local irrigation, may be employed after the bath.

Loss of the Graft.

Loss of the graft may be due to hæmatoma formation and this should be dealt with immediately or loss of graft or flap will occur. The patient should be returned to the theatre, hæmostasis secured and the graft reapplied. It is a complication of the first twenty-four hours.

Loss of the graft due to infection is indicated by pain, discharge, rise of temperature, cellulitis or lymphadenitis between the second and the fifth days. The graft should be dressed, chemotherapy continued systemically and locally and all dead graft removed in order that further loss of the graft will not occur. When previous infection has had to be dealt with, complete take of grafts is not universal and if more than half the graft "takes" with persistent and severe infection, there is no occasion for disappointment.

The graft may be a great surgical success and may prove life-saving, but because it cannot sustain occupational trauma or because it interferes with the function of joints it may be a functional failure. Pressure should be maintained on all grafts for the first three to four weeks. From the fourth week to three months the grafts tend to be indurated and hard owing to the subjacent fibroblast maturation. During this phase, massage with "Vaseline" or lanoline is to be commended. Depending on the thickness of the graft, sensation begins to return about the end of the third month, and the degree of return of sensation is an index of what protection will be required. Grafts on exposed surfaces are liable to circulatory changes in cold weather and even to chilblain formation, so that they should be kept covered in the winter until these features disappear.

Conclusion.

The surgery of the skin has lagged behind the surgery of the endodermal, mesodermal and other ectodermal derivatives, which has made great strides and kept apace of all modern scientific advance. Despite its importance, the subject of skin surgery receives scant attention in any curriculum and is ill-understood by many practitioners.

British surgeons, particularly Sir Harold Gillies, have featured largely in furnishing practical contributions in this sphere, and we should be duly proud of our heritage. The results of a balanced but nevertheless vigorous attack on the problems of skin loss expand the scope of surgery and yield gratifying results not to be obtained by other methods.

Today the surgery of the skin has become more than ever within the scope and ambit of many surgeons where the "hopes of zeal are not entirely groundless".

PRE-OPERATIVE RADIOTHERAPY IN THE TREATMENT OF OSTEOGENIC SARCOMA: A PRELIMINARY COMMUNICATION.[1]

By R. KAYE SCOTT, M.D., M.S., F.R.A.C.S., F.F.R., D.T.R.E.,
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IN 1936, G. F. Stebbins of Lambeth Hospital described to me a technique of external radiation therapy utilizing many small increments spread over a prolonged time period. He suggested that osteogenic tumours would show response to irradiation delivered along these lines.

Scott (1937) showed that connective-tissue tumours have a relatively low radiation sensitivity compared with tumours arising from epithelial tissues. He showed that cells in mitosis are more sensitive than the resting cells of the same tissue.

Connective-tissue tumours are regarded as radio-resistant because they do not respond to the usual techniques in which large doses are administered over periods of one to four weeks. It is known that normal connective tissue is less able to recover from the effects of single large doses than from those of multiple small dosages. The method advocated attacks the mitotic sensitivity of cells of connective-tissue origin by the use of repeated small doses spread over a course lasting ten weeks. Repeated courses of this duration are given after suitable rest periods.

Stebbins suggested tissue tumour dosage of the order of 100*r* to 150*r* per day. This dosage should be administered with radiation of as hard a quality as practicable, for example, a beam of half-value layer of 2·0 millimetres of copper. Depending on the tumour site and depth, skin doses of the order of 150*r* to 200*r* are given four to five times per week, and the treatments are continued for ten weeks. Dosage increment and frequency may be reduced after the first few weeks. A tumour dose of 4500*r* should be attained in the first ten weeks' course, and slightly lower dosages in the subsequent courses. Courses should be repeated at regular intervals after a rest of ten weeks. At the eighteenth-month stage amputation should be carried out if practicable, subject to the non-development of metastases by the patient. The appearance of metastases means that further treatment is suspended.

Prolonged treatment along these lines produces a first degree reaction in four to six weeks, which reaches its height at the six-week to eight-week stage. Treatment may have to be diminished to avoid a vesicating reaction, but usually the reaction subsides even though the treatment is continued. The integrity of the skin should be preserved so that subsequent irradiation may be given.

The patient soon admits relief of pain, and cessation of tumour growth is noted, though no diminution in swelling is seen till the six-week to eight-week stage. Persistent pain indicates lack of response to the therapy. At the twelve-week stage radiological indications of repair should be seen with recession of the soft-tissue mass, increased deposition of calcification, or healing by new-bone formation. Lytic areas in the bone may show regeneration, periosteal repair may be seen and fluffy margins bordering areas of bone destruction may become smoothed off. Bone repair in the soft-tissue mass is the last evidence to appear. The repair process continues during the following twelve months in cases of response to the irradiation.

Macdonald and Budd (1943) have shown that cases of osteogenic sarcoma may be grouped into two classes: those of short history which develop metastases very rapidly, and those with a history dating over three to six months which do not develop metastases so rapidly.

Ferguson (1940) has shown that early operation saves only 8% of patients affected while delayed operation saves 29%, and he advises that pre-operative irradiation be instituted while operation is temporarily postponed. No doubt metastasis is inevitable in many of the more malignant variety, but over all cases it has been observed that early surgery seems to accelerate the appearance of metastases.

My theory is that damage to normal tissue cells liberates growth-promoting substances, which stimulate cell growth and granulation-tissue formation to allow repair. Massive tissue damage, such as would occur at amputation, may liberate large quantities of such substances, which may stimulate growth of distantly deposited tumour cells. Dissemination of tumour cells must occur at an early stage in osteogenic sarcoma, but the body has a defence mechanism against their growth (Willis 1934*a*) and such processes should be assisted. Immediate surgery might thus stimulate tumour growth and so hamper any inactivating mechanism.

Preliminary radiation therapy used with the technique described does inactivate the tumour locally in a considerable proportion of the cases, and it is likely that

[1] Read at a meeting of the Section of Radiology and Radiotherapy, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

the flooding of tumour emboli into the blood-stream is stopped relatively early. The body therefore would have an increased chance of overcoming any deposits already existing if the onslaught on the pulmonary capillary bed by malignant cells could be abated. In this way the preliminary irradiation might act. The defence would be assisted by general measures designed to maintain nutrition and well-being, attention being directed to diet, vitamins and tonics; while rest to the tumour-bearing part by splinting might also tend to diminish dissemination. The destruction or temporary walling-off of secondary tumour deposits in the lungs is well authenticated (Willis, 1934*b*).

The radiation technique utilized will not sterilize the tumour. I have noted local recurrences after seven, six, and four and a half years, in three cases in which the tumour initially showed response to radiation. Therefore, surgery should be undertaken as soon as sufficient time has elapsed to allow the lungs a reasonable chance of overcoming any preexisting microscopic secondary deposits. If pulmonary metastases do develop, nothing further can be done. Our case records show that a large number of metastases appear within three months and a few within three to nine months, but if a patient survives twelve months the risks of pulmonary metastasis are greatly diminished.

So a patient should wait at least eighteen months to see that pulmonary metastases do not appear; and if indications are then favourable, amputation should be undertaken. The selection of this time is purely arbitrary, as are the periods of duration of the courses, and the skin and tumour increments given. However, a local response has been obtained in two-thirds of the cases in which treatment has been carried out by this technique.

If operation is refused, or if on account of the site it is impracticable, further prolonged courses should be administered at intervals, say, of a year. The integrity and tolerance of the overlying skin are the determining factors.

Analysis of the Results.

Local response was obtained to X-ray therapy without subsequent development of metastases within eighteen months in six cases.

Local response was obtained to X-ray therapy without subsequent development of metastases within fourteen months (these were recent cases) in two cases.

Local response was obtained to X-ray therapy with development of metastases within twelve months in five cases.

No significant response was obtained to initial irradiation in five cases.

In four cases of Paget's disease with sarcoma, no improvement occurred.

The total number of cases in which treatment was carried out was thus 22. If we exclude the cases of Paget's disease, then in 13 out of 18 cases local temporary control was obtained in response to the prolonged-time radiation technique used.

The case material can be divided into four groups: group A, osteogenic sarcoma in long bones in juveniles; group B, osteogenic sarcoma in flat bones in older patients; group C, the chondrosarcoma group occurring in patients of the cancer age; group D, osteogenic sarcoma supervening on Paget's disease.

Group A contains the most malignant conditions. Treatment has been carried out in 13 cases, of which two are recent. One patient survived seven years before showing local recurrence; amputation was not considered practicable. One patient is well after two and a half years, and two others are due for amputation in the immediate future. In nine of the 13 cases local radiological repair and tumour subsidence have resulted from the technique used, but metastases developed in six of the cases. In three cases no local improvement occurred, and nothing is known about the result in the remaining case.

Two cases fall into group B. In one, that of a proven osteogenic sarcoma of the ilium, the patient survived for six years before showing local recurrence and died after eight years; in one other case no immediate response to the irradiation occurred.

The chondrosarcomata in group C are less malignant and all have shown local response. In the first case the patient was not submitted to amputation until local recurrence occurred after four and a half years, following on a very satisfactory local response. In one case the patient refused amputation at the eighteen-month stage and the tumour recurred at the end of two and three-quarter years, after which amputation was performed. The other patient is well after amputation, carried out one year ago after preliminary X-ray therapy administered during the first eighteen months.

Group D consists of cases of osteogenic sarcoma supervening on Paget's disease. In no case in this group has response occurred to the prolonged technique here suggested, and treatment with radiation is not considered justifiable in view of the lack of useful response. If we exclude the four cases of Paget's disease, 18 other cases are available for review.

In eight cases out of 18 local response occurred without the subsequent development of metastases within eighteen months.

In five cases out of 18 local response occurred with the development of metastases within eighteen months, and further treatment was suspended.

In five cases no local improvement was shown with the initial radiation treatment.

Information is available as to the time of the appearance of metastases in 13 cases. This occurred within the first three months in four cases, within three to nine months in three cases, and within nine to twelve months in two cases. In cases in which local response was obtained to radiation, no development of pulmonary metastases occurred during the twelve-month to eighteen-month stage, though in one case metastases appeared at the two-year stage. In three cases the patients survived with ultimate development of recurrence at the primary site after four and a half, six, and seven years.

Confirmatory histological evidence has been obtained in 11 of the 18 cases described. Aspiration biopsy is regarded as the method of choice for this investigation, as incision into the tumour is apt to allow local fungation, a disaster which occurred once in the present series. The aspiration method is not uniformly successful, but open biopsy should be undertaken only as a final resort.

The radiation technique presented is one which has temporarily controlled more than two-thirds of the treated osteogenic sarcomata and so is an advance on previously described methods.

McNattin (1944) described a technique in which massive doses were used, but destruction of skin was usually involved, though he did obtain satisfactory local tumour recession.

The technique is designed to produce local tumour recession. The patient is then allowed sufficient time to demonstrate that secondary deposits have not developed. The prior appearance of metastases demands cessation of active treatment. Amputation is advised at the end of eighteen months, provided that local response to the radiation has been satisfactory and that the lung fields remain clear of secondary deposits.

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REHABILITATION OF THE DISABLED IN AUSTRALIA.[1]

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Introduction.

IN many countries, and particularly in Britain and the United States of America, a system of medical care has evolved which must eventually be incorporated into our present concepts of the practice of medicine and will be taught to medical students as an essential part of their training. This system of care states quite frankly that the functional result after injury or illness is more important than the anatomical or pathological result, and that the responsibility of the physician continues until there is restoration of the sick or injured person as a complete personality to the fullest physical, mental and economic functioning of which he or she is capable. This process of complete restoration is what we mean when we use the term "rehabilitation". It is not much good, for example, getting a perfect anatomical result in a labourer with a compound fracture of the femur if this man has meantime lost his job, is unable to return to a similar occupation and has had no help towards getting new and suitable employment.

This basic conception of treating the whole patient has been used for centuries. Hippocrates spoke of it and all wise clinicians have used it in many generations of medical practice. They have said that you have to treat the whole person, his mind as well as his body, and to encourage him to take an active part in his own recovery. The family doctor has been in touch with the domestic, social and employment background of his patient and has done much more than prescribe the mixture or wield the surgical knife. In recent years, however, with the ever increasing array of scientific aids to medicine, and a much more intensive specialization by doctors, there has been a less close association by the doctor with these domestic, social and employment factors.

Rehabilitation, as we call it now, with this emphasis on active convalescence, occupation, social adjustment and employment, is therefore a return to basic principles. But doctors now have available the help of a highly skilled team of physiotherapists, occupational therapists, social workers, and education, training and employment authorities. Rehabilitation procedures have been greatly developed and have been standardized.

Much of this development and standardization came with the recent war, with its ever-increasing demand for manpower for the services, for industries and for the production of food. Doctors were asked to give all possible help in this vital task of getting people back quickly on the job after illness or injury and in advising on the types of employment for those previously regarded as being unemployable. In Britain, a Cabinet Minister, Mr. Aneurin Bevan, has said:

> One of the best things that has come out of the war is the development of the rehabilitation services. It has enlarged all our ideas about what can be done for the injured man or woman. It offers a new hope for a full active life after accident or quicker recovery after illness—a real road back to health.

The Extent of the Problem of Disablement in Australia.

There is no accurate information regarding the extent of the problem of disablement in Australia. We do know, however, that (i) approximately 300,000 persons medically examined did not meet the required standard of fitness for the forces for the 1939-1945 war; (ii) approximately 130,000 persons were discharged from the forces during the war as being medically unfit; (iii) there are 73,000 persons in Australia drawing the invalid pension and the increase averages five to six thousand each year.

On comparison of our population figures with the results of intensive survey in other countries, it would appear that, apart from invalid pensioners, there are not less than 75,000 people in Australia who have a degree of disablement which makes it difficult for them to obtain and retain employment.

Rehabilitation in the Australian Forces.

During the war years, through the active interest of the Director-General of Medical Services, Major-General S. R. Burston, medical rehabilitation procedures were set up in army hospitals and in convalescent depots. These, together with the work of the Army Rehabilitation Service and the Army Education Service, provided a pattern of team work between medical and lay authorities which had been unknown in civil hospitals. By this team work, which was also established in the Royal Australian Air Force and in the Royal Australian Navy, the service member with severe disability not only was given the opportunity for full recovery, but was helped towards the occupational niche suited to his aptitudes and his remaining abilities.

Rehabilitation in the Immediate Post-War Period.

Although the rehabilitation procedures set up by the services were not fully used in the immediate post-war period, they were later, to a quite considerable extent, reestablished by the Repatriation Commission. Education officers have been appointed to the Repatriation Commission and education and training committees, with medical and lay representation, have been set up to consider the vocational problems of the more severely disabled ex-servicemen who are under the care of the Commission. The guiding principle of pooling medical, educational and vocational opinion has been in this way continued.

There remained problems of many other ex-servicemen and women with disabilities not accepted as being associated with war service. The Government therefore undertook in Part IV of the *Reestablishment and Employment Act*, 1945, to make available certain rehabilitation provisions for those having a disability, but not accepted by the Repatriation Commission for war pension and medical benefits. These included facilities for making persons fit to undertake training to obtain employment and maintain themselves in employment. There was also provision of text-books and tools of trade with the payment of certain allowances.

In an interim scheme administered by the Department of Social Services, for which authority was given by Cabinet in 1945, a start was made to provide these facilities, and the scope of this work was later greatly widened by the Rehabilitation Plan administered by the Department of Social Services for which authority was given in June, 1946.

Summarized, this plan for ex-members of the forces had the following aims:

1. To ensure that early and adequate treatment was given to persons who had served with the forces, were not eligible for Repatriation benefits, but had a disabling condition precluding early and full resumption of employment.
2. To provide rehabilitation centres, both residential and out-patient, where physical reconditioning and prevocational training could be given.
3. To arrange facilities for vocational training and employment of such physically handicapped persons.
4. To secure coordination and integration of the phases of treatment, training and employment.
5. To provide an allowance, slightly higher than the unemployment and sickness benefits, so as to encourage such physically handicapped persons to take advantage of these facilities.

These aims will be briefly discussed.

Treatment.

Treatment was arranged by the Department only when it was not readily available through the normal civilian agencies of the member's own doctor or the public hospital.

[1] Read at a meeting of the Section of Orthopædics and Physical Medicine, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

Except for medical supervision while the patient was in the medical rehabilitation centres, treatment has not been provided by doctors working for this scheme either in a salaried capacity or on a sessional basis. When treatment has been given by the patient's own doctor or by a specialist, the fees have been paid by the Department of Social Services.

Rehabilitation Centres.

A residential rehabilitation centre has been established in each capital city in Australia with the exception of Tasmania, where the facilities of a Red Cross rehabilitation centre have been used. These centres have been planned along the lines of army convalescent depots and Royal Australian Air Force medical rehabilitation units. They have good facilities for physiotherapy and occupational therapy, and technical workshops and educational facilities have been available. Each person admitted has been put on to a regular, active routine of physical reconditioning to expedite his convalescence. Two of these centres, one at Jervis Bay in New South Wales and one at Victor Harbour in South Australia, were taken over in their entirety and conducted on the same lines as when they had been used as Royal Australian Air Force medical rehabilitation units. It has been hoped to establish out-patient rehabilitation centres in the capital cities at which a more intensive convalescent routine of physiotherapy, occupational therapy, and pre-vocational training can be provided than is possible in the out-patient department of our public hospitals. It was planned that such centres would be available to any doctor so that he could, if he so desired, follow-up his own patient to completion. Difficulty in obtaining suitable accommodation has prevented the establishment of these centres except for one established in a very limited way in Perry Park, Brisbane.

Vocational Training and Employment.

Vocational training has been arranged through the Industrial Training Division of the Department of Labour and National Service, and selective employment has been the responsibility of the Disabled Persons (ex-service) Section of the Commonwealth Employment Service.

Coordination and Integration.

The securing of coordination and integration of the phases of treatment, training and employment has been the function in each State of rehabilitation consultative panels, which have been similar in composition to those which dealt with the same problems in the Australian army. The members of the panel are the doctor, administrative officer, social worker, vocational training officer and employment officer. The job of this panel is to bridge the gap which so often exists in civilian life between the end of active treatment of disablement and the point of return to employment. Members of this team visit the rehabilitation centres, and planning for the disabled person can therefore be commenced at a relatively early stage of treatment.

Medical Staff.

The medical staff has consisted of a coordinator of rehabilitation attached to the Ministry of Post-War Reconstruction, a post which I held from its inauguration until I relinquished this work, and a deputy coordinator of rehabilitation in each State. Each deputy coordinator has had special training and experience in rehabilitation methods, several of them having been sent overseas by the services to study this work, and it has been their job to advise on the medical aspects of disablement and to coordinate the work between the various people and departments concerned. These have been the only salaried medical officers. Other medical officers have been employed on a sessional basis on terms similar to those adopted by the Repatriation Commission.

Results of Scheme.

This scheme ended on February 28, 1948. Since it was inaugurated approximately 11,000 men and women of the forces from the 1939-1945 war, not eligible for war pension and treatment by the Repatriation Commission, have received benefits from it. For them the definition of eligibility for such disablement benefits was perhaps a liberal one, since it was defined as a disablement which would incapacitate the member for a period of not less than six weeks. It was felt that in the immediate post-war period an illness or injury lasting for this time would interfere in the reestablishment into civil life of members of the forces by putting a strain on their financial resources and by interfering with normal employment possibilities.

It can be said with confidence that this scheme proved itself of value to these members of the forces. It helped their reestablishment, it enabled them to return to employment much more quickly than would have otherwise been the case, and it made them feel that an interest had been taken in their reestablishment into the community. This scheme has also given the opportunity for developing a pattern of team work between medical and non-medical authorities which can be used in tackling the very much greater problem of disablement in the civilian community. It would be idle to say that the scheme has worked perfectly. There is always a human factor in any scheme, and it has to be remembered that this has been a new idea to Australia and that people have had to be educated to its value. Moreover, the number of trained professional staff has been exceedingly small and this has limited the amount of work which could be done. It has made one feel, however, that if a well planned and well administered scheme could be used to rehabilitate the many thousands of severely disabled people who are at present an economic loss to this country, considerable national benefit would follow. Throughout the whole of this work the necessity for medical guidance has had to be consistently emphasized and the fact constantly reiterated that rehabilitation of disabled people is a community affair and cannot be carried out by departmental decree. It will be remembered that in Great Britain the British Medical Association has taken an active part in this work and, by forming a rehabilitation committee as long ago as 1937, the Association has been able to guide and influence the development of governmental rehabilitation policy. Britain, too, has brought community interests into its rehabilitation policy and has not restricted opinion to that of departmental officials.

Possible Future Developments.

In February, 1948, Cabinet decided that the plan for the rehabilitation of ex-servicemen and women would come to an end and that its place would be taken by a rehabilitation plan for certain groups of people in the community. These groups are (i) invalid pensioners or claimants for invalid pensions, and (ii) those receiving or claiming unemployment sickness benefits who are likely to remain unemployable unless rehabilitation assistance is given.

It is also recommended that there should be a report within twelve months on the practicability and desirability of including adolescent disabled persons in this plan, and of including ultimately members of certain recognized industrial disease groups.

It is understood that legislation to put these proposals into effect is likely to be enacted this year.

Eligibility for Benefits in Civilian Rehabilitation Plan.

My recommendation has been that persons accepted for rehabilitation benefits should have a disability likely to last not less than six months, to be a substantial handicap to the person in securing employment, yet to be remediable and to allow of reasonable prospects of employability within two years. It was further recommended that while medical examination to determine eligibility should be free, the cost of medical treatment should be borne by the Commonwealth only to the extent to which the patient was unable to meet this expense.

It is undoubtedly true that this plan will deal with only a relatively small proportion of the disablement existing in the community today. However, it does represent the first major step in attacking this civilian problem, and

it is recognized that to tackle the whole problem of disablement in a comprehensive way means the building up of facilities and the training of large numbers of necessary professional staff. This will take a great deal of time. It may mean the training for this special work of doctors, nurses, physiotherapists, occupational therapists, medical social workers, physical training instructors, instructors in arts and crafts, educational officers, vocational training instructors, employment officers and clerical staff.

It is believed that with the diminishing reestablishment requirements of ex-members of the forces, the administration of this proposed rehabilitation plan will be for the present with the Ministry of Post-War Reconstruction, passing at a later date to the Department of Social Services.

The Medical and Surgical Conditions for which Medical Rehabilitation Procedure has been Found Effective.

Medical Conditions.

While special measures of rehabilitation are unnecessary for patients suffering from minor short-term illnesses, it should be noted, and is stressed in the Scottish Report on Rehabilitation of 1946, that the greatest number of cases of chronic incapacity are medical rather than surgical and that a comprehensive scheme of rehabilitation will be largely concerned with satisfactory resettlement in such cases.

General Surgical Conditions.

A large percentage of patients with acute surgical conditions make a reasonably full and rapid recovery and, apart from routine measures of physiotherapy and diversional therapy, only a small proportion of patients with surgical conditions require special provision for rehabilitation.

Fractures and Orthopædic Conditions.

Patients with fractures and orthopædic conditions are eminently suited for rehabilitation, and patients of these two types form approximately 50% of the total of 784,796 persons registered in Britain in 1947 under the *Disabled Persons (Employment) Act* of 1946. Encouragement and assistance should be given to civil hospital authorities, including those in country districts, to establish (*a*) fracture clinics and (*b*) orthopædic clinics and long-stay accommodation for children and particularly for adults with orthopædic disability.

Rheumatic Fever and Heart Disease.

There are great potentialities for rehabilitation in respect of rheumatism and heart disease, particularly perhaps for children with rheumatic heart infections. Graduated physical activities and eventual placement in suitable employment are particularly necessary for these persons. Special centres should be set up, including long-stay facilities for cardiac patients.

Chronic Rheumatic Disease, including Articular Rheumatism.

Chronic rheumatic disease, including articular rheumatism, affords good opportunities for effective rehabilitation procedure.

Diseases and Injury of the Central and Peripheral Nervous Systems.

Australia lags far behind other countries in recognition of the value of rehabilitation in the field of diseases and injuries of the central and peripheral nervous systems, particularly paraplegia and spastic paralysis. The results obtained in Britain and America in cases of paraplegia are outstanding and reflect upon the efficacy of our methods in Australia and upon our lack of concentrated efforts for the unfortunate patients concerned. The paralysed person is so often regarded as bed-ridden and impossible of salvage; whereas it has been clearly shown that by active methods of rehabilitation these men and women can get about and lead active and useful lives.

Pulmonary Tuberculosis.

A rehabilitation programme is particularly important in pulmonary tuberculosis, and many sanatoria have shown how effective this may be. In Victoria, a rehabilitation medical officer has been appointed for this work by the State Department of Tuberculosis. The problem of employment of persons with tuberculosis may relate particularly to employment under special or under sheltered conditions.

The Neuroses.

Rehabilitation in psychiatric cases constitutes another special problem, and an efficient psychiatric service must be closely linked with vocational rehabilitation and selective employment. Britain has already made considerable progress in tackling this problem.

Blinded Persons.

It is estimated that there are in Australia 5000 blinded persons, of whom more than two hundred owe their disability to war. The education and training of blinded persons are in most countries accepted as a national responsibility. In all but two States in Australia the responsibility rests with voluntary institutions. Uniformity of measures has not been achieved and there are grounds for believing that a wider approach, along the lines developed at Saint Dunstan's in England, could be adopted. Recently some twenty ex-servicemen have been sent to Saint Dunstan's.

Deafness.

For the deaf, vocational training and selective employment are very necessary. No reliable statistics are available of the number of deaf persons in Australia, but it is noted that in Britain 30,000 persons are registered. It is well known that many deaf persons develop psychiatric manifestations because of unsuitable employment, which in their attempt to overcome their work disability increases their nervous strain.

Industrial Diseases and Hazards.

Certain industries, such as the mining industry, require special consideration. In Britain progress reports relating to the rehabilitation of miners have been submitted by the Miners' Welfare Commission to the Standing Committee on the Rehabilitation and Resettlement of Disabled Persons.

Summary.

I have attempted to set out briefly the development of the plan for restoring to economic usefulness certain handicapped men and women who have served in the 1939-1945 war with the Australian forces. This experience has shown in a practical way how much could be done for the very large number of disabled persons in the community. It would be good national ethics as well as good national economics to extend this work to the civilian disabled.

Rehabilitation cannot, however, be carried out by governmental administrative instructions. I repeat that rehabilitation is a community effort, and that the support of the general community and, in particular, of the medical profession, is completely necessary. Without adequate medical guidance no scheme for disabled persons can succeed. It is hoped that the Government will recognize this and aproach this important problem with liberality of vision and imagination, because this scheme can be of inestimable value to Australia.

On us as doctors there also rests a responsibility. We have to take a wider view of our own part and realize that we can give greater aid to our patients so far as their return to full and satisfactory employment is concerned than is covered by our purely technical treatment. As doctors our problems are sociological as well as purely professional. In an address given recently to new medical graduands at the University of Edinburgh, Professor J. R. Learmonth, Professor of Surgery, says: "At once you must abandon any idea that you must confine your work to medical practice". Learmonth goes on to suggest to

doctors that they should merge their professional problems with those of the society in which they find themselves, and that they should include in their scientific mission, personal, social and economic problems as well as vocational problems. In the leading article in THE MEDICAL JOURNAL OF AUSTRALIA of December 13, 1947, there is this comment regarding Professor Learmonth's remarks: "We have seen that what we may call the content of medicine is becoming wider and wider and we have noted that a university teacher in Scotland can put before an audience of graduands sentiments and arguments that, dealing with medicine in its wider content, are charged with encouragement and challenge".

If this concept of the wider content of medicine was put into practice in Australia we could reasonably expect a diminution in the number of unemployed disabled people. We could also anticipate a great decrease in the ranks of those peripatetic—and often pathetic—chronic inhabitants of the out-patient departments of our public hospitals.

THE INJURED BACK.[1]

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BACK injuries are so common and their after-effects often so crippling that an inquiry into their immediate and subsequent treatment is justified.

With the injured worker and his compensation, the injured back sometimes becomes a problem requiring the opinions of several specialists. The cost in litigation can be considerable, also the loss of wages sustained by the employee. Taking the outlook of physical medicine, let us consider the injured back under the following headings: (i) simple muscle and ligamentous strain, (ii) displacements or subluxation of joints, (iii) displacements of cartilage, (iv) arthritis *et cetera*, (v) congenital and postural abnormalities, (vi) fractures, (vii) psychosomatic backache.

Simple Muscle and Ligamentous Strain.

When a simple muscle strain occurs, there may or may not be immediate disability or loss of function. Usually the pain is not severe until some time afterwards, when the body cools down after work. The strained muscle with its torn fibres, soon begins to exude serum or extravasate blood, according to the degree of injury. When tension is sufficient to cause pain, and with the irritation of exudates, muscle spasm and greatly increased pain occur. The immediate treatment is like that of the sprained ankle: rest and you are in for trouble; rub and move for quick results. Often the patient is put to bed and remains there until much of the acute pain goes. If he is not quite better, he goes to his doctor, still with pain and also with early adhesions. If these are prevented, the patient should be back to normal quickly.

The methods of treatment used to be as follows:

(i) The application of heat to improve the circulation and so carry away the immediate exudate and extravasated blood. (Forms of heat in common use are infra-red rays and short-wave therapy.) (ii) Massage to disperse these products of injury—*effleurage* first, then deeper massage. (iii) Movements and exercises to give the muscle its natural massage—that of contraction and relaxation—as well as to strengthen the muscle for normal function. (iv) The injection of "Novocain", the aid of which is tremendous. A few millilitres of 0·5% "Novocain" solution injected into the most tender spots, daily if necessary, help greatly. The procedure relaxes spasm, relieves pain and allows better movement and more exercise. This routine should be given after the first twenty-four hours. Barry of Bundaberg (1938) proved that "Novocain" injection and early movements prevented much trouble later (Cyriax, 1944).

The presence of adhesions is suspected when the patient wakes stiff in the morning, this stiffness passing off with a hot shower and movements, only to return again after rest. The patient then rests more and more. This lack of movement leads to further stiffness and pain. These early adhesions are repeatedly strained and torn, and each time more and more fibrosis results. Before long chronic traumatic fibrositis with adhesions is present. Once adhesions have developed, the former routine has added to it that of manipulation. This means forced movements—one quick twist is often all that is required. It is seldom necessary to perform all movements. For example, flexion and extension and side bending appear to be covered by the usual exercises. In my experience it is rotation which is the most effective manipulation. This can be given quickly and simply. To some extent a localization of the movement of the vertebræ can be achieved by varying the position of your hand and varying the method of manipulation.

The examination of a back is important, and an appreciation of soft tissue pathology is essential for success. Young (1943) has made a valuable contribution in this field.

After acute strain of the muscles and fasciæ of a back, it is not uncommon in the subacute state or in the chronic stage following to find localized areas of tenderness, which are known as fibrositic nodules. These are easily palpated with the patient lying prone over a low pillow in order to obtain better relaxation. That these are the cause of pain is easily demonstrated by the immediate relief given by injection of "Novocain". The origin of these nodules is variable, but the treatment is much the same as was outlined for muscle strain.

There are certain factors which, if present, predispose the subject to back strain: faulty posture, with its accompanying chronic muscular and ligamentous strain; weak muscle, due to obesity; sedentary life and lack of exercise; deformity—for example, spondylolisthesis, kyphosis, scoliosis *et cetera*; senile osteoporosis; congenital abnormalities; the last-mentioned, as you know, are common in the lumbar region.

Displacements of Subluxation of Joints.

Simple dislocations of the spine do occur, often in the cervical region and usually in the lateral joints. These are easily reduced with manipulation, particularly by the use of Sayre's or Glisson's head sling. If the dislocation is more severe and in consequence more painful, a general anæsthetic may be necessary. This simple dislocation may be shown in the cervical region by X-ray examination, but the displacement, if any (for it may be only a strain of the ligaments), may not be seen on X-ray examination. Very minor dislocations, I am sure, cannot be detected; but the rapid relief given by manipulation suggests that some subluxation is present. This undoubtedly appears to occur in the sacro-iliac joint. The patient stoops to lift something and feels a stab localized to the sacro-iliac joint. Pain is referred from this region down the posterior aspect of the thigh, sometimes as far as the knees. If the condition is of only a few hours' duration, immediate relief is often given by a simple manipulation. If the patient comes to you after some days or weeks, muscle spasm and faulty gait have produced a state of the spine in which adaptive shortening or even adhesions have developed. This does not allow immediate total relief, but only partial relief, the remaining disability passing off with heat and exercises. Barger (1946) makes the following statement:

> The longer the interval between the onset of pain and the manipulative procedure, the more likely there are to be productive changes, due to irritation and disturbed circulation and the more difficult to correct by manipulation.

With any muscular or ligamentous strain, with any subluxation or dislocation, and with all fractures, there is, to a more or less degree, muscle spasm with consequent pain referred from this area. The reference of this pain will vary according to patterns which have been worked

[1] Read at a meeting of the Section of Orthopædics and Physical Medicine, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

out by many writers. "Novocain" injection is a help in elucidating the patterns of these referred pains. These tender areas felt in muscles are clearly defined. When they are due to spasm, the mechanism is simple, but not so in the case of the fibrositic nodule. This is a localized tender area in muscle or fascia and even in fat. Various theories about their pathology have been put forward, each theory having perhaps a modicum of truth (Copeman and Ackerman, 1947). Practically, they mean remove the cause, be it toxic, metabolic or chronic strain, and give the appropriate physical therapy and "Novocain".

In low-back conditions there are one or two pitfalls. Acute lumbago can come from acute muscular spasm with the toxic or metabolic basis of gout. The administration of "Atophan" or colchicum is a useful test, if estimation of the blood uric acid content is not considered worth while. The physical treatment is usually the application of heat, but anodal galvanism may help to relieve pain, with other measures such as elimination by bowels and kidneys. Elimination by the skin is important and can be achieved in many ways, from foot baths to Turkish baths.

Another trap is *spondylitis ankylopoietica*. This condition in the early stages may produce acute pain localized to the sacro-iliac joint. Spinal rigidity may or may not be present. It can start acutely, and an X-ray film may reveal a fluffy appearance only. Usually affecting males, and in their early life (fifteen to thirty years), the disease is progressive. Treatment with deep X-ray therapy is most satisfactory. In most early cases the disease is arrested and the patients become free of pain, with improved spinal movements. The pathology of this disease and its relief by deep X-ray therapy are two problems requiring explanation.

Displacements of Cartilage.

A very common type of backache is that due to the intervertebral disk. If backache is associated with sciatica, the neurological findings are a help; but occasionally one sees a patient with an acutely painful back, which comes on suddenly with stooping and often some slight lifting strain. There may or may not be X-ray evidence of a narrow disk. Even with positive X-ray findings, it is not certain that the disk is causing the backache. In these cases the backache may be due to disks or to strain or subluxation of the lateral spinal joints. In the early stages, rest and physical therapy in the form of short-wave therapy and "Novocain" injections into spastic muscles often give relief; but if relief is delayed, manipulation must be considered. Many spectacular cures come this way. Probably these are cases in which prolonged disability has led to post-traumatic adhesions in and around the nerve roots or spinal joints. Manipulation may relieve these.

Arthritis et Cetera.

There are other conditions which, if there is even a minor injury, may lead to prolonged backache. For example, senile osteoporosis and hypertrophic osteoarthritis are most easily affected by strain. Most of the damage is probably directed to the ligaments, which have become inelastic owing to fibrosis or actual bony hypertrophy. Prolonged physical therapy in the form of short-wave therapy, massage, "Novocain" injection and support by splints, is often the only means of relief. Manipulation and exercise seldom help.

Congenital and Postural Abnormalities.

Patients with such abnormalities as scoliosis, spondylolisthesis, and unilateral sacralization of the fifth lumbar vertebra are perhaps more prone to injury than others not so affected.

Fractures.

After the fracture has been diagnosed and the appropriate orthopædic treatment given, it is necessary to rehabilitate the patient. In cases of fracture of a body of a vertebra, in which a plaster jacket is applied, early physical therapy is prescribed so that appropriate graduated exercises can be carried out.

In a simple compression fracture, the exercises are directed to the maintenance and further development of the back and abdominal muscles. In fractures when hyperextension has been used, it is necessary, as soon as the plaster has been removed, to direct the exercises to the correction of posture. On the other hand, patients with compression fractures which have occurred during electric convulsion therapy appear to do well without plaster or splint of any sort.

The Psychosomatic Backache.

One of the trials is that type of painful back which appears with great frequency in those injured with or without fracture as a result of an accident, especially when compensation is a consideration.

The psychosomatic backache (Fletcher, 1947) may be difficult to detect. When there is a definite history of trauma (especially if it occurred during work), all the means at our disposal must be utilized. That it is possible for such patients to have their symptoms even more fixed by the administration of physical therapy is recognized; but then, that is not good physical medicine. With a medical man frequently reviewing the case and driving the patient to get on with exercises and occupational therapy, this should not occur. The best examples of this were seen in the centres of rehabilitation all over the world during the recent war. There is no place in a physical therapy department for the malingerer or purely psychosomatic patient.

Traumatic neurasthenia is always a problem. Much of it is an anxiety neurosis, in which the fear is that of inability to do work with consequent unemployment. The lesion may be a minor one with a pronounced degree of incapacity, and how much is neurasthenia and how much organic lesion is never easy to say. In the former, encouragement and movement will help, and so also in the latter if movement is indicated. As the spine is regarded in the lay mind as an important nerve centre, any injury is likely to be regarded as serious. Reassurance that no damage is done, together with encouragement in movement, is a good help in preventing traumatic neurasthenia. Again, the presence of a degree of osteoarthritis, as seen by X rays, is taken by the lay mind as sufficient evidence of trouble. It should be carefully explained to the patient that this is often not the cause of symptoms, and that what we now see was, in all probability, present a considerable time before the injury. Much of it is only wear and tear with the normal degenerative processes which occur in us all.

Proof that pain can be coming from soft tissues can be obtained by the use of "Novocain" anæsthesia. Cyriax (1947) is of the opinion that many cases of traumatic neurasthenia could be prevented by thoroughness, perseverance and early physical therapy.

The commonest cause of backache is the muscular or ligamentous strain. It occurs in both industrial and rural occupations with such frequency that it is a major problem in departments of physical therapy. The incidence may be as high as 30% (Comroe, 1940). Again, it should be emphasized that early relief of pain and early movement are the secret of success.

The development of adhesions causes pain which demands treatment. Because of our neglect in the past, unqualified practitioners have been given the golden opportunity to perform the miracle cure. The fact that adhesions have developed when early treatment and not rest could have prevented them, is a slur on our work. When the circumstances are such that adhesions are inevitable, then we must deal with them at the earliest chosen time. No patient should be regarded as cured until pain, disability and loss of function are all eliminated.

Krusen (1941) summarizes the position in this way:

> The management of backache is a very complicated problem. The causes are so varied that one cannot hope to produce beneficial effect unless the diagnosis has been fully established. Once the diagnosis has been made, it will be found that in many instances the employment of physical treatment of various kinds will be a distinct adjunct to other forms of treatment.

In some instances physical treatment will be the most important single factor. . . . It has been well said that "The causes of backache are legion".

Finally, to quote Krusen again:

> It is hoped that some of the phases of this complex problem have been clarified and that enough has been said to justify the recommendation of the employment of physical therapy in a number of forms of backache.

Summary.

1. The commonest cause of back injury is simple muscle and ligamentous strain.
2. Adhesions may be prevented and treated by physical therapy and "Novocain".
3. Other factors in and causes of back injury are discussed.

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ROUTINE TREATMENT OF COMPOUND FRACTURES.[1]

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THIS is an historic month for this section of the Congress, for on August 12, 1865, Joseph Lister successfully treated a compound fracture of the tibia with a planned carbolic antiseptic technique. This happy result, fateful for the progress of our art, was the beginning of a long series of revolutionary results in the treatment of this morbid, and then most often fatal, lesion.

Besides the open fracture, three principal complications—wound shock, hæmorrhage and infection—concern us especially from the moment of infliction of the trauma. The first aid demands the application of a clean antiseptic dressing, a firm bandage to control hæmorrhage, comfortable splints with traction on the limb, and, above all, a minimum of movement for patient and limb. The Thomas bed knee-splint serves best for the lower limb. This apparatus has saved lives and reduced morbidity more than any other single mechanical advance in fracture treatment—and yet it is not in common use by civilian ambulances. One sees this most efficient organization using more cumbrous and less efficient immobilization for transport of patients with lower limb fractures. There is room for cooperation between surgeons and ambulance workers here. Moreover, with a little thought the limb could be efficiently suspended and thus shock development would be less favoured.

In hospital, traction and splintage are continued, unnecessary movements are interdicted and clothing is undisturbed except for clinical examination. Hæmorrhage is controlled again by the application of pressure antiseptic dressings. Tourniquets are avoided, as they increase pain and shock. Oxygen is administered in the more severe forms of collapse. The patient is not heated unless his temperature is found to be subnormal. A blood count, a hæmoglobin estimation and blood transfusion cross-matching are carried out. Morphine eases pain and reduces shock. A radiographic examination with the portable machine is ordered. Tetanus and clostridial antitoxins are given. In all cases of compound fracture of the long bones the intravenous infusion of plasma is commenced immediately, at a rate determined by clinical appearances. By this time the matched stored blood will be ready, and may be given as indicated. With these routine procedures the development of irreversible wound shock is decidedly uncommon and serious shock is rarer still—with the exclusion, of course, of those patients who arrive in a moribund condition. A note of warning is necessary regarding intravenous therapy, for the enthusiasm engendered by its life-saving effects sometimes leads to too rapid administration of too large quantities, with consequent development of lung œdema and rapid circulatory failure. Penicillin and sulphonamide therapy is commenced before the patient goes to the operating theatre.

The wound revision is deferred till a satisfactory clinical improvement is present, for the operation is always a serious one. I consider as satisfactory a systolic blood pressure over 90 millimetres of mercury and a pulse rate under 110 per minute, with restored blood volume. I will not proceed to the operating theatre otherwise.

General anæsthesia is used in all long-bone compound fracture operations. Spinal anæsthesia is dangerous and courts death from further falling of the blood pressure. The nitrous oxide, oxygen and ether mixture is ideal if the anæsthetist is experienced, so as to avoid relative asphyxia in an already depressed patient. As a routine measure, ether given by the "open" method is the most useful agent.

The operation is likely to be bloody, and the temptation to use a tourniquet is well-nigh overpowering. Its use is countenanced only in the preliminary stages of preparing the limb for revision, in cases in which hæmorrhage is profuse. Once the operation commences the tourniquet is removed, for it increases tissue anoxia, promotes tissue death, encourages gas gangrene and suppuration and may paralyse the large nerve trunks by direct pressure. If it is used, its pressure should be just above the systolic blood pressure, and only a pneumatic tourniquet can ensure this. In the upper limb only the latter type should be used.

The intravenous drip therapy is continued throughout the operation, at which one first immobilizes the limb, ever keeping in mind the minimizing of shock and hæmorrhage by so doing, and being helped thereby to carry out the manœuvres more easily. For the lower limb one has the horse, a frame, or even a home-made loop and wall-pulley. In the case of the upper limb, a diligent assistant is a fair substitute for apparatus. One next prepares the limb for revision of the wound. The literature does not well describe the procedure. The wound surroundings and the steadied limb are meticulously cleansed with soap and water, particular attention being paid to the cutting and cleansing of nails and to the washing of hands and feet. The limb is shaved in the affected limb segment and this area is painted thoroughly with skin disinfectant.

One next washes the wound itself, using a Higginson's syringe or an overhead douche can with tubing and long nozzle. An antiseptic solution is liberally played all over and into the depths of the wound and under the skin flaps, as far as we can reach with ease. A high pressure is maintained so that the fluid gushes liberally from the wound. One to two gallons of fluid are so used.

Some authorities frown on this procedure—most irrationally I submit. Still more do they discountenance the use of antiseptic solution—again irrationally. The surgical pendulum has swung from Lister, with all his astonishing success, to Watson-Jones, who condemns antiseptics outright. Indeed, most modern authorities forbid them. Lister, with a technique that, even at its highest and final development, did not approach our meticulous procedure, had truly magnificent results by using antiseptic washes throughout the wound, which, as far as I can gather from his papers, he did not enlarge. Professor Saxtorph, of Copenhagen, could write to Lister in 1870 that, since he

[1] Read at a meeting of the Section of Orthopædics and Physical Medicine, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

had adopted Listerism, not one case of bone suppuration had occurred among his compound fracture patients. Volkmann, of Halle, informed Lister that for over two years not one patient with a compound fracture had died. I am not advocating a return to Lister's methods, but I plead that they be remembered. There are germs in the tissues of a compound fracture—let us wash them out. Let us also kill them, if we may do so without injuring tissues. This we can certainly do with some of our modern antiseptics, which are harmless in low concentration applied for a short time. We use "Dettol" in 5% concentration at our hospital, or "Monacrin" 1/1000 solution. In regard to the use of lavage, there is no logical objection. It is interesting to note in Professor A. K. Henry's "Extensile Exposure Applied to Limb Surgery" a similar advocacy of lavage with the application of mild antiseptic. He learned the fundamentals of the method in pages of Lejars in a 1903 edition. May I quote and heartily agree with his words?

> When I see better results than theirs [his assistants] in open fractures on as large a scale with any other method I shall wish to try it.

It is admitted, of course, that the older the wound the less good does lavage do. However, even though there has been a moderate bacterial invasion of the tissues, detritus and infected fluids will be flushed out.

Having completed the preliminary lavage, the surgeon now resterilizes his hands, changes his gown and, with the wound carefully draped as for any operation, revises it if the wound is under twenty-four hours old. Devitalized skin is removed. In civilian accidents most frequently the skin is not severely damaged. Conservative removal of a few millimetres is all that is needed. Even in jagged wounds the contours of the wound are followed and are not neatly "straight-lined", for there is not a large amount of skin to spare in the limbs, and experience shows that extensive skin removal is not necessary.

The wound is next enlarged in the direction of the long axis of the limb. Cruciate incisions are to be avoided. If the wound is transverse, longitudinal prolongations from either end are much preferred, a Z-shaped wound thus resulting.

The wound is now draped with side towels. The deep fascia is trimmed and slit in the direction of the wound axis. Muscle tags are removed. The muscle wound is enlarged in the long axis with due regard to anatomical safety, important nerves being avoided. Lifeless muscle, as judged from colour and contractility, is excised. In this regard, civilian subjects rarely show any great amount of devitalized muscle. The wound tract in the muscle is excised—sparingly if the wound is under eight hours old and more boldly if it is older. There is no need for a bold and wild excision of muscle tissue, even in wounds twenty hours old, when four or five millimetres are sufficient; but of course the surgeon has great latitude in this regard. The enlargement of muscle and fascial wounds should be sufficient to obviate any difficulty in introducing the retractors, which are next used to expose the fracture itself. In fractures compounded from within the perforating fragment is first and easily seen. The other fragment is displayed with more difficulty, for frequently there is a large wad of muscle tissue between them. Foreign bodies are carefully sought for and removed. Only small pieces of detached bone are removed. Large segments of bone, especially those involving a whole diameter, are left, for their removal will ensure non-union. Partially detached fragments are not disturbed. Special attention is paid to the perforating fragment, and any dirt and loose spicules are diligently swabbed therefrom. Blood clots are removed. The whole of the cavity in which the fragments of the fracture lie is exposed. Metallic foreign bodies shown by X rays are not diligently sought for if fresh tissues have to be opened up much and time taken in the search—the patient has been hurt enough without our adding to his injuries. Foreign bodies are submitted to cultural examination for organisms.

A second lavage of the wound is now performed, one to two gallons being used. An assistant pours antiseptic solution, followed by sterile water, in a strong stream from a jug into the gaping retractor-held wound. This flushes out every recess. There is no fear of the stream's carrying infection further into the wound: it cannot, because all recesses are open and available to the cleansing flush.

Manipulation of the bone ends to reduce the fracture is avoided, unless this means merely simple leverage of easily seen and handled fragments, as is possible sometimes, especially in the tibia, but less frequently in other bones. To perform an open reduction thus in all cases would often entail needless and damaging dissections and tissue handling. Wires, pegs, screws or plates are not used to hold reduced fragments in place. This point needs discussion, for in some quarters plating or metallic fixation is freely advised. I submit that it is seldom advisable, despite the fact that series of successful cases have been reported. In spite of temptation almost, beyond what he is able to resist, the surgeon ought not to fix internally an open fracture. By plating he adds a foreign body to a potentially infected area—he handles injured tissues unnecessarily, perhaps enlarging the wound needlessly. Moreover, the approach to a compound fracture seldom corresponds with an incision of anatomical choice, and it is not often elegant to convert a haphazard wound into a classic approach; while the making of another convenient exposure means embarking upon a second operation on a patient not prepared for it. Even when the fracture is compounded in the line of classic approach, I submit that the operation of plating is ill advised. Foreign bodies in these wounds increase infection risks. The stripping of bone necessary to apply a plate further decreases the blood supply, which is already damaged—and this in an area where we have grave reason to fear infection. As a witness to the effect of this stripping we note the slowness of union in plated closed fractures—plated under ideal conditions. The surgeon is further stayed from plating many compound fractures, because the tension in the swollen tissues often prevents his closing the wound.

It is conceded that many of these compound fracture patients will later come to internal fixation of the fracture, and therefore immediate plating is *per se* an advantage to quicken convalescence. Still, the local state and clinical condition countermand it, and we would do well at present to follow the advice of that superlative technician W. Arbuthnot Lane, who gainsaid plating, even if allowance is made for our great chemotherapeutic aids which he did not possess. It is not uncommon to see suppurating "metallized" compound fractures; Lane saw so many that they embittered him.

Continuing the operation, one dries the cavity, ensures hæmostasis and dusts 100,000 to 200,000 units of penicillin powder into the wound. Sulphonamide powder is not used here, for its benefit is doubtful, and occasionally we see an intense local allergic reaction. Severed tendons or nerves may have to be dealt with, and if the severed ends are available without prolonged search, they should be anchored adjacent to each other or each in contact. The treatment of either of these lesions is a problem demanding its own technique and after-treatment, and these needs will seldom be opportunely met during the treatment of an open fracture. Indeed, the subsequent manipulation to reduce the fracture may again tear apart a sutured nerve or tendon. There are, of course, exceptions to this advice; for instance, the extensor tendons of the phalanges are often advantageously sutured in compound fractures, and when the bone ends in a compound fracture of a long bone near a joint are not noticeably displaced, nerve and tendon suture may safely be carried out if the wound is one that is to be closed. In general, however, it is safest to adopt the principle of first things first and nerves and tendons later.

The surgeon now decides whether or not he should close the wound. The experience of war surgeons will help him to a quick decision in the case of battle compound fractures. The conditions under which the wound is received, the state of the soldier, the type of transport, the time between infliction and treatment, and the treatment itself, all vary so that it is necessary to have a standard—do not close the wound. Moreover, the surgeon cannot follow and

treat the subjects all through, for the soldier is soon again transported. Civilian patients are treated generally within a few hours, and the surgeon works with the same team and is able to perfect a technique, the good results of which entitle him to close the wound and achieve primary union, provided that the wound is under eight hours old, that no tension at all is put on the tissues by the suturing and that hæmostasis has been obtained. It is thoroughly bad surgery to suture the wound under tension. The muscles and skin are lightly coapted, but not the fascia, for it is too tense. Frequently the muscles will come together, but not the skin. The latter is then left gaping, and the gap is filled with well "Vaselined" gauze. It is not good practice to close skin over a gaping wound in the muscles.

Closure of the wound is contraindicated when the wound is over eight hours old. There is then a likelihood that infection, even though subclinical, has been established in the walls of the wound. The whole cavity is then packed down to bone with the "Vaseline" gauze. Closed or open, the wound is then covered with *tulle gras*.

This routine treatment has been used in our adult and children's hospitals for the last fifteen years. The surgical results have been so excellent that the treatment of compound fractures is now approached with utter confidence. One hundred and six patients with fractures of the long bones have been treated in hospital. Primary union occurred in 91 cases, and in the rest granulation was allowed. There were one case of mild bone infection and one case of soft tissue suppuration; both these occurred ten years ago. There have been no deaths among patients submitted to revision. These results are not due to the advent of modern chemotherapy, as this has been used only for about the last five years. This list included many cases in which the compound wound was only a puncture from within. These, of course, are notorious for their smooth course under most regimens. Following John Hunter's practice, Lister's treatment of these wounds was merely to protect the wound coagulum from disturbance, and some modern surgeons do not submit them to revision. As there is a big risk of infection even with such tiny perforations, we have subjected them to the routine treatment.

Some surgeons hold that closure of a compound fracture wound is no advance, for, closed or open, the wound will heal before the fracture. One would answer that careful method makes closure safe in early civilian cases, and it is at least theoretically sound to have all wounds closed as soon as possible. Moreover, a number of open fractures later require internal fixation, and in these cases it is a distinct saving to have a healed wound quickly.

When the fracture is over twenty-four hours old, excision is not wise despite our chemotherapy, for we cannot gauge the depth or quality of the certain infection present. The tissues are opened up freely down to the bone fragments and the gauze open treatment is adopted. Only one of our cases came into this category.

The fracture is now reduced exactly as if it were compounded. The clinical state of the patient usually permits our doing as we will in this regard, but we sometimes have to be satisfied with a standard of reduction lower than our wont. In this case final alignment can be performed some days later, or postponed till the wound is healed, when we decide that a plating is indicated. The sooner the reduction, the sooner œdema will subside. Post-traumatic œdema is often severe, and the surgeon has to give sufficient scope for it, no matter what method of fixation he has adopted. Hence the plaster cast must always be split and ready for immediate spreading when this is indicated by circulatory or pressure difficulties. Over-enthusiasm and lack of appreciation of the dangers of accurate splinting and binding have led to undesirably frequent ischæmia, mild degrees of which are fairly common and not generally recognized.

The non-padded plaster cast has earned a reputation of being the most generally useful immobilizing splint. Prolonged, uninterrupted, rigid and extensive immobilization and undisturbed rest to the wound, can be just as well, and sometimes better, achieved with other splints. The Thomas bed knee splint is ideal for the femur, and a well-fitted aeroplane splint is suitable for the humerus. Plaster casts, excellent for transport, are unsuitable for treating fractured femurs. Modern technique is not wedded to the non-padded cast.

When healing by first intention occurs, there is no further special treatment for the compound fracture. If an open drained wound is present, the latter should be disturbed infrequently. In plaster the wound is permitted to "stink" its way to recovery, as the great Pirogoff had noticed that it will. If no complications supervene, the first dressing and change of plaster usually take place after six weeks, although an unbearable odour may insist on a change sooner. In any case the job is an operating theatre one and the fracture alignment must not be altered. In cases in which the fractured limb is treated in calipers or splints, the outer dressing can be changed when saturated or unpleasant; but the wound plug is only seldom changed, as growing granulations do best with no disturbance. They also prefer a moderate counter-pressure to grow against, for with this they do not become œdematous. This is one of the great advantages of the plaster cast, and when this is not used, it is important to keep the dressing firm.

It is interesting to read that Lister practised our modern post-operative treatment of these fractures. He sealed the wound, allowing for drainage, and strictly forbade frequent dressings. Like Lister, we should leave these wounds exposed for as short a time as possible during dressings. Surgeon Larrey had also noticed the benefits of leaving a compound fracture undisturbed and "stinking". The Trueta modern therapy is but an extension and perfection of the technique of our ancestors.

For the prevention of dermatitis from wound discharges under plaster, I have found the following ointment an almost certain prophylactic, smeared well on the skin surrounding the wound: equal parts of *Unguentum Picis*, *Unguentum Zinci Oxidi* and *Unguentum Plumbi Subacetatis*.

Chemotherapy is continued till a carefree convalescence of four days indicates that infective dangers are past.

Secondary suture of the wound is not frequently advisable. The surgeon has to consider the states of patient and wound. By the time wound œdema has subsided and the patient is well enough for a second operation, early cicatricial and granulation anchoring of the muscles and skin may have occurred, and secondary suture cannot be performed without dissection. When skin only needs closure, I find secondary closure useful if performed in the first week. There is less œdema in wounds with the routine use of penicillin and wound healing is quicker, and so secondary suture is more feasible today. Lately I have had opportunity to cover skin defects with late pinch or split skin grafts, and these have been of great help in preparing compound fractures for delayed plating and in improving scar qualities. I have had no experience of the immediate skin grafting of these wounds with large skin defects. Provided that the principles of treatment can be otherwise carried out, the method certainly has a place in therapy. We must remember, however, that the initial skin defects are often apparently greater than the actuality, on account of the often enormous swelling present.

I cannot well discuss here the treatment of infected compound fractures, but I shall indicate the guiding rules: free and dependent drainage, immobilization under the principles outlined above, the earliest possible identification of the guilty organisms and the removal of sequestra as soon as involucra show on the radiograph.

We now anxiously wait for chemotherapy to conquer the big three, *Pseudomonas pyocyanea*, *Bacillus coli communis* and *Proteus vulgaris*. Even with this next great advance, it will not be technically possible or surgically advisable to close all compound fractures. The wisdom of the ages has bequeathed to us surgical principles whose practice must permeate any technique, although the latter may alter from day to day.

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THE INDICATIONS FOR OPERATION ON THE INJURED BACK.[1]

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WHEN the back is injured any of its component structures may be involved; there may be fractures or displacement of the vertebræ, involvement of the cord or nerve roots, and injuries to the intervertebral disks, to ligaments and to muscles, and operative treatment may be considered necessary.

What are the indications for operation on the injured back? I propose to divide such indications into two main groups: firstly, immediate operations—that is, those required shortly after injury—and secondly, late operations, required for effects apparent some time after injury.

Immediate Operations.

I will deal only briefly with the first group. Most fractures and displacements of the vertebræ can be dealt with by such measures as traction, hyperextension or manipulation.

Forward dislocation may occur with complete overriding and locking of the articular processes on one or both sides, associated with extreme lateral angulation or rotational displacement. Facetectomy may be required to allow reduction of the dislocation.

Another immediate operation which is rarely required is laminectomy to relieve cord compression due to acute retropulsion of an intervertebral disk or bone fragment.

Late Operations.

I will deal now with conditions arising some time after the date of injury.

Compression Fractures.

Compression fracture of a vertebral body of which good reduction has not been obtained is likely to produce localized spondylarthritis due to malalignment of the posterior intervertebral articulations. Fortunately such a development is not inevitable, because fusion may occur between the damaged vertebral body or bodies and those above and below. This is due to new bone formation anteriorly and laterally and is more likely to occur if the associated disks are damaged.

Many patients, however, have increasing pain and disability owing to the development of arthritic changes, and immobilization is required to relieve the symptoms. Conservative treatment should first be tried, particularly in the case of elderly patients, for whom the wearing of an efficient support may be sufficient. In the case of younger patients, a fusion operation to immobilize the arthritic joints is the best treatment. This should not be an extensive fusion operation, it should be sufficient only to immobilize the affected joints.

Disk Lesions.

In the last few years the important role played by the intervertebral disks in maintaining the integrity of the spinal column has been recognized.

The fibrocartilaginous disk is composed of a central turgescent *nucleus pulposus* surrounded by the *annulus fibrosus* and limited above and below by the cartilaginous plates which fuse the disk to the vertebral bodies. The intervertebral disk commences to undergo retrogressive changes in the third decade of life, and such changes are greatly accelerated by trauma. Any of the three component parts of the disk may be involved; defects may occur in the cartilaginous plates or the annulus may be ruptured, usually posteriorly. The nuclear material flows out through these openings in the annulus or cartilaginous plate, with resulting loss of disk tissue and consequent thinning of the disk (Coventry, Ghormley and Kernohan, 1945). Impairment of the stabilizing and supporting function of the disk occurs, and added strain is thrown on the posterior intervertebral or apophyseal articulations and on neighbouring ligaments.

Although this condition occurs in any region of the spine, the lower lumbar disks are those most often affected, with the production of low back pain and disability. In addition to these symptoms, referred sciatic pain may be excited as a reflex from the joint irritation (Craig and Kessel, 1948; West, 1947). Such referred pain is termed arthrogenic.

Protrusion of disk material posteriorly into the spinal canal may also occur; trauma is thought to be the cause, with degeneration of the annulus as a predisposing factor. The disk material by impingement upon a nerve root within the canal or foramen may cause intractable pain in the corresponding scleratome. I do not intend to enter into a discussion of the symptoms and pathology of this condition, which is well known to you all.

What are the indications for operative treatment in disk lesions? Conservative measures should first be tried, and in most cases the condition clears up with such measures. In other cases the protrusion occurs later with development of sciatica. In others again further degeneration occurs, leading to chronic low-back pain with or without referred limb pain. The treatment of this last class is again primarily conservative—a period of complete immobilization followed by the protection of a brace and precautions against strain. However, if such measures are unsuccessful and the disability is sufficiently severe, permanent fixation of the affected joints by a fusion operation is indicated. I wish to emphasize, however, that only the minority of patients require this operation.

In many cases of referred pain, the origin is difficult to determine, whether it is due to pressure or to stretching of a nerve root by protruded disk material, or whether it arises reflexly from apophyseal arthritis. If doubt exists, the nerve roots should be explored, because exploration after fusion has been secured by bone grafting is rendered more difficult.

Arthrogenic sciatica is most common in the middle and later age groups, and the patients usually have a long preceding history of chronic low-back pain; also the back pain rather overshadows the referred pain—which, however, may be quite severe. Pronounced thinning of the disk is seen in the X-ray film, and often adjacent disks are seen to be involved; frequently, evidence of arthritic changes in and around the apophyseal articulations can be observed in the radiographs. Well-defined neurological signs are more constant in cases of disk protrusion, although too much reliance cannot be placed upon this observation.

A fusion operation, if performed, should, I think, include at least the vertebra above and below those adjacent to the affected disks, because the disks in the immediate neighbourhood are probably affected by the increased strain which has been thrown on them, although this may not be evident by radiographic examination.

Patients are occasionally seen in whom all the lumbar and often a number of the dorsal disks are the site of degenerative changes. Although this usually occurs in elderly people, it is at times seen in those in the middle-age group. It seems as if these subjects have an inherent weakness in their intervertebral disks as some of us have in our arteries—poor material has been used in their make-up. The multiple lesions probably occur primarily in the cartilaginous end-plates. These patients are usually best treated conservatively, because too extensive a fusion procedure would be required to fix all the affected vertebræ.

[1] Read at a meeting of the Section of Orthopædics and Physical Medicine, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

Prolapsed Disks.

In the case of suspected disk prolapse with radiculitis, a period of conservative treatment and observation is first required. Diagnosis is important, and it must be kept in mind that other conditions such as pelvic tumour, vertebral neoplasm and tuberculosis may closely simulate the condition.

J. Albert Key, discussing the treatment of disk prolapse, stated that the patients to be operated upon are those who have had a disability over a sufficient period to warrant it, or who have a disability of sufficient degree, which cannot be relieved by non-operative means. He does not think that more than 10% of the patients in whom he has diagnosed a protruding disk should be operated upon (Key, 1940). I am in agreement with this. However, I am also strongly of the opinion that conservative treatment should not be persevered with for too long if it is not producing satisfactory results.

I have had experience of patients with symptoms of one or two or more years' duration which have been completely cleared up by operation, but the patients have suffered unjustified pain and disability during the long period of conservative treatment.

If operation is required, the herniated material and degenerated portion of the disk should be removed by modified laminectomy (Barr and Mixter, 1941). Complete exposure of the root in the intervertebral foramen may be required to relieve compressions (Briggs and Krause, 1945).

The question then arises whether an attempt at fusion should be made at the same time as the disk is removed. My own opinion is that if from the X-ray appearances it is considered that the disk is so much damaged as to lead to instability and arthritic changes in the posterior joints, then fusion should be performed, but not otherwise.

I think it is reasonable to assume that healing with stability will occur in the case of a damaged disk, provided the damage is not extensive, if protection from strain is provided for a sufficient period. In these cases now it is my practice to fit a corset or support, and warn patients against subjecting the back to strain for six months after any disk operation.

A fusion procedure, if performed, must be so designed that the affected articulations are immobilized, and any type of operation which produces this result should be satisfactory.

Although in these remarks upon disk lesions and associated spondylarthritis I have dealt mostly with lesions occurring in the dorso-lumbar and lumbar regions of the spine, such conditions may of course occur in the cervical and dorsal regions.

A common condition of spondylarthritis is that found in the mid-dorsal region, usually secondary to mild scoliosis of the postural type. The disk is seen in radiographs to be thinner on the side of the concavity at the apex of the curve, and lipping of vertebral bodies and often new bone formation in the region of the foramen and articular processes are sometimes visible. Besides localized pain, these patients may have referred pain extending around the intercostal region at that level. Rotation movements strain this region of the spine and cause pain.

It is difficult to immobilize this portion of the spine, although it can be done by means of a high plaster jacket. If relief cannot be obtained by conservative measures, operation is indicated; the affected nerve root is explored and divided and a fusion procedure is performed at the same time. This fusion should extend over four vertebræ, two above and two below the affected disk.

Spondylolisthesis.

Although trauma at birth has been advanced as a cause of spondylolisthesis, the underlying lesion is generally thought to be non-fusion of anomalous ossification centres in the neural arch; there is a bony defect in the neural arch situated between the superior and inferior articular processes on each side, with fibrous union. Greater strain than normal is placed on the associated intervertebral disk, which tends to degenerate as age advances, and this, with stretching of the fibrous union at the site of the defect, allows progressive forward displacement of the upper body to take place, with the production of low-back pain.

Mild degrees of slipping can be held in check and the symptoms relieved by an adequate support. I use the term "adequate" advisedly, because many back braces in use are in my opinion quite inadequate for this condition.

If the symptoms cannot be controlled by this means, a fusion operation should be performed, because the condition is progressive, causing increasing disability as the degree of deformity progresses.

Sciatic pain may develop after trauma in cases of spondylolisthesis, and then we must consider the coexistence of protrusion of the degenerated disk. In my experience, although sciatic pain is not uncommonly a symptom of spondylolisthesis, it has usually been found to be arthrogenic in origin, and has been completely relieved by fusion without exploration of the nerve roots. However, Meyerding reports seven dual lesions out of 143 cases from the records of the Mayo Clinic (Meyerding, 1943), so this possibility must be kept in mind. If disk protrusion is suspected from the severity of the sciatic pain with accompanying neurological signs, then exploration of the nerve roots is indicated; but in my opinion this should always be accompanied by fusion.

Comment.

As a final word, allow me again to emphasize my opinion that conservatism should be the rule when one is considering the indications for operation upon the injured back. The patient must be considered from every angle, including the psychological angle, and operation should be undertaken only after a trial of conservative treatment, and in the presence of definite indications.

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ENDOMETRIOSIS.[1]

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THE subject matter of my address is endometriosis, and in selecting this I am prompted by two reasons. In the first place I must admit that the significance of this condition, although it is not uncommon, is not always appreciated, except by those who are doing a great deal of work in diseases of women. Secondly, in view of the more divergent theories in regard to its pathology, I feel that it is a worthy subject for discussion at this Congress. Apart from the foregoing, I consider that in the past only scant attention has been paid to this problem in gynæcology,

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and I say advisedly that it is a problem—at times—especially when one is faced with the question of sterility and chronic invalidism in young adult women. Furthermore, I am of the opinion that it is only in recent years that medical men in general practice are becoming aware of certain symptoms in the diagnosis of this condition. Some consider that endometriosis is becoming more common than it was in the past, but in reality diagnosis is more accurate in recent years—hence the apparent increase in the number of cases.

This address is based upon 76 cases of endometriosis which I have encountered during the past four years.

Definition.

The term endometriosis may be defined as an abnormal growth of endometrial tissue outside the uterine cavity.

TABLE I.
Age Incidence of Endometriosis.

Age Group. (Years.)	Number of Cases.
20 to 30	15
30 to 40	31
40 to 50	26
50 to 60	4
Total ..	76

Age Incidence.

The age incidence in my own series of cases is shown in Table I. The youngest patient was aged twenty-one years and the oldest fifty-four years. The greatest incidence was between the ages of thirty and fifty years. Other reports show a similar age incidence.

Location.

Endometrial deposits are found in the female organs of reproduction and in structures in close proximity. The parts most commonly involved are the ovaries, either one or both, uterus tubes, utero-sacral ligaments and recto-vaginal septum. Deposits have been encountered in the round ligaments, broad ligaments, bladder and peritoneum and in the abdominal scar resulting from Cæsarean section. Blue-domed cysts were encountered in the posterior vaginal fornix four times, and twice I have seen involvement of the rectum simulating ring carcinoma. Endometriosis has also been found to have involved the caecum, appendix, hernial sacs and umbilicus.

At this point let me make a brief reference to adenomyosis, which is endometriosis invading the muscle fibres of the uterus, and is technically described as *endometriosis interna* as distinct from *endometriosis externa*, in which other parts of the pelvis are involved. Both these conditions are frequently found together.

Pathology.

Endometriosis occurs especially during the reproductive life of the individual, as the aberrant implants and the endometrium are both activated by ovarian secretion. Ablation or complete removal of the ovaries will cause a definite regression of the disease with partial or complete relief of symptoms depending upon any existing induration or inflammatory reaction in the adjacent pelvic organs. Endometrial implants have the same histological structure as the glands of the uterine mucosa and they are subject to activation by the ovaries with the production of cyclical bleeding. As there is no escape for the blood from the peritoneal cavity, it accumulates and sets up local inflammatory reactions in various parts of the pelvis, causing adhesions to adjacent organs, and eventually infiltrating those organs. This applies particularly to the utero-sacral ligaments, the recto-vaginal septum and either one or both ovaries, the latter frequently becoming walled off in a mass of adhesions and, owing to this continued activity, becoming distended with so-called "chocolate material" and forming cysts. With each menstrual cycle these chocolate cysts tend to become larger with corresponding destruction of healthy tissue, and they may rupture, causing acute abdominal symptoms. I have seen this in two patients awaiting operation for this condition and I mention it as endometriosis is usually regarded as a chronic disease.

A notable feature in regard to endometriosis is the presence of black puckered areas, sometimes with cyst-formation in whatever tissue or organ it invades. These black puckerings may be only the size of a pinhead, and they are most commonly found on the ovary, the broad ligament, the posterior surface of the cervix and along the attachment of the utero-sacral ligaments. The condition progresses slowly, and the cysts rupture at times and release their tarry contents further afield in the pelvis; if this fluid contains active endometrial cells, fresh implants may be produced in other parts. Adhesions are practically always associated with endometriosis. In the early stages they may be only filmy, but in advanced cases with involvement and invasion of neighbouring organs they may develop into the condition known as "frozen pelvis"; in this case surgery is out of the question.

What then is the reason for this strange disease about which we have so much clinical data, but the origin of which is still an unsolved riddle? There are several theories and many have their good points, but there is nothing conclusive as to the activating force which sets this strange condition in motion.

Theories in Regard to Endometriosis.

The presence of endometrial tissue outside the uterine cavity was demonstrated by von Recklinghausen in 1896. He showed the similarity between the endometrium of the uterus and the islands of endometrial glands found in the musculature of the uterus and the response of the deep-lying intramuscular glands to ovarian activity during menstruation. Russell and others about 1896 noted the presence of aberrant endometrial tissue involving the utero-sacral ligaments and rectum.

Müllerian Theory.

In 1899, Russell reported the first case in which endometrium had been found in the ovary, and he attributed its origin to an aberrant portion of the Müllerian duct. Others supported this theory and pointed to the fact that they are both derived from cœlomic mesothelium.

Sampson's Theory.

Sampson propounded the theory that *endometriosis externa* was due to reflux of menstrual blood back along the tubes with resulting implants of endometrial cells in the pelvic peritoneum and adjacent organs. These implants subsequently become activated by hormones. Sampson's theory may have several points to recommend it, but his observations do not account for the presence of umbilical implants or the invasion of the pelvis following excision of the tubes. It is not likely that his theory could account for every case, and Sampson himself has stated that if the mucosal cells in the regurgitated blood are dead, then this theory can no longer be sustained. In 1925, he stated that spread might occur via the uterine veins and lymphatics.

Other Theories and Investigations.

Halban (1924) maintained that endometrial implants in the pelvis were due to lymphatic spread. He based this statement on the finding of uterine mucosa in the inguinal, sacral, iliac and parametrial lymph glands of five patients who had been operated upon for endometriosis. If this were so, one would expect a very wide distribution of endometrial cells, but this is not the case, and it is rare for endometrial cells to be found in lymph glands.

Jacobson experimented with the transplant of endometrial cells into the peritoneum of animals and succeeded in producing localized growths, but it must be remembered that he was dealing with healthy endometrium and not with the desquamated, dead cells of menstruation.

Hein, working with monkeys, created a utero-abdominal fistula which secreted menstrual blood directly on to the peritoneum, but failed to produce implants, perhaps because he was dealing with desquamated cells thrown off during menstruation.

Cron and Gey grew endometrial tissue from material curetted during the second day of menstruation, but in this case it was suggested that they must have removed some of the basal decidua as well as the menstrual decidua, hence the resulting endometrial tissue.

Serosal Theory of Ivanoff and Meyer.

I have referred briefly to these foregoing theories and observations as they do not appear to prove anything positive, but in a negative sense they support other views.

This brings me to the most likely theory that has been put forward and which has been supported by recent workers: the theory of metaplasia advocated by Meyer and Ivanoff.

Independently, Meyer and Ivanoff suggested that pelvic endometrial deposits occurred as a result of hormonal stimulation of some pelvic peritoneal cells causing a change in the nature of these cells whereby they developed into endometrial cells. Ovarian stimulation activated these cells, producing local reaction in the areas involved. This theory is based upon the observation that the pelvic peritoneum, the uterus and appendages have a common origin from the cœlomic epithelium.

Novak's View.

Novak has expressed the opinion that implants which occur in the lumen of the tubes are secondary to primary endometriosis of the ovary. This observation is very interesting in view of the excellent research carried out by King of Melbourne in 1933. He maintained that "endometrial-like hæmorrhagic cysts of the ovary result from changes in cystic atretic follicles and cystic *corpora lutea*", and gave microscopic evidence to support this contention. From his observations he considers that the absolute sterility commonly associated with endometriosis of the ovary (20% to 70%) is due primarily to ovarian malfunction. The actual pathology of endometriosis is still obscure, and the hormonal or chemical activity which sets this condition in motion is still unknown.

Symptoms.

In the early stages of endometriosis there may be no symptoms at all, and even in an advanced condition the patient may not be aware of any unusual symptoms; but on pelvic examination severe pain and discomfort may be elicited from pressure on movement in the region involved with implants.

The chief symptoms are (i) dysmenorrhœa gradually becoming more severe, particularly noticeable in a patient who has not previously complained of any pain; (ii) primary or secondary sterility; (iii) rectal pain and pain on defæcation, particularly during a menstrual period, with occasionally sudden shooting pain up the rectum; (iv) irregular uterine bleeding (this may or may not be present); (v) lower abdominal pain.

Associated symptoms are (i) backache, (ii) dyspareunia, (iii) pains down the thighs and in the groins, and (iv) increasing constipation.

Diagnosis.

During examination of the pelvis I would stress the importance of the use of a vaginal speculum to note the appearance of the cervix as regards any hypertrophy and the presence of blue-domed cysts, particularly in the posterior fornix; the presence of these is pathognomonic of endometriosis. During bimanual examination movement of the cervix away from the site of the lesion will almost certainly elicit pain in that region. The presence of small, hard, tender nodules palpable in the posterior fornix is most significant. When the uterus is retroverted, attempts to replace it will cause acute pain if the utero-sacral ligaments and posterior vaginal fornix are involved. If the rectal wall is implicated referred pain will be felt in the rectum as well. The uterus may be normal in size, or enlarged and irregular, this depending on the presence of other pathological conditions such as adenomyoma or fibroid tumours, both of which are found in association with endometriosis. Rectal examination will confirm the presence of tender nodules in the posterior fornix. It is important to note that involvement of the rectum may simulate a carcinoma of that organ. In cases of this nature spread is due to an extension of the endometriosis to the adjacent part of the colon.

Further confirmation regarding the possibility of carcinoma may be obtained from the finding of a peculiar filling defect on X-ray examination after barium enema. Sigmoidoscopic examination causes localized pain in the region involved, but the mucosa is intact and it is rare to see bleeding in endometriosis. Then finally at operation the typical puckering of the serous coat of the bowel with presence of endometrial implants should confirm the diagnosis.

Treatment.

The type of treatment will depend on (*a*) the extent of pelvic involvement (including whether or not the condition is bilateral), (*b*) the age of patient, and (*c*) any associated sterility.

For young women treatment with injections of testosterone propionate up to 150 milligrammes per week has been used with relief of symptoms, but this treatment may tend to produce masculinization, apart from the fact that the apparent improvement is not maintained when the injections are discontinued.

Surgery has to be resorted to in the majority of cases, and, whenever possible, conservatism in young women is essential. With endometriosis in both ovaries and small peritoneal implants in adjacent organs, both ovaries may be resected, and the implants cauterized. Even in more advanced cases involving one or both ovaries, it is best to leave even a small portion of healthy ovary. In severe cases involving the utero-sacral ligaments and rectum and perhaps the base of the bladder, total or subtotal hysterectomy with removal of both ovaries will be necessary. In the frozen type of pelvis, surgery is virtually impossible and it is better to close the abdomen and to use deep therapy to inactivate the ovaries. This should cause a retrogression of the disease with easing of pain and discomfort. This last-mentioned treatment should never be used except for inoperable conditions.

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PREGNANCY AND INTESTINAL OBSTRUCTION: A DANGEROUS COMBINATION.

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NOT many reports of intestinal obstruction as a complication of pregnancy can be found in the literature; the standard text-books of obstetrics, if they mention the condition at all, do so with but scant recognition of the dangers inherent in this combination. Johnstone (1934) does not mention the possibility; "The Queen Charlotte's Textbook of Obstetrics" (1943) gives three lines to the subject under causes of abdominal pain in pregnancy, and remarks that the obstruction is usually due to carcinema of the pelvic part of the colon or of the rectum and also to adhesions and herniæ. De Lee (1943) discusses the possibility of ileus in pregnancy due to the same causes as produce it outside of pregnancy, or to compression or torsion of the intestine by the growing uterus. Irving (1943) devotes four lines to the subject.

The incidence of this complication of pregnancy is very small. Weintraub and Jaffe (1940) reported three cases in 32,000, and Casagrande (1936) two cases in 11,246. The incidence at the Women's Hospital, Sydney, over the last eight years has been ten cases in 29,526 deliveries. All authors reporting cases give a high maternal and fœtal mortality; Eliason and Erb (1937) give an over-all mortality rate of 46·5% in 175 collected cases.

Ætiology.

Wangensteen (1942) makes the following statement:

> In cases of adhesive obstruction following operation, appendicectomy is the most frequent cause of intestinal obstruction—a large proportion have usually required drainage. Operations on the female pelvic organs rank second. There seems to be no correlation between the location or presence of the adhesions and the development of intestinal obstruction, which may occur at any time after the operation—the average in one series being two years and three months.

In Eliason and Erb's collected series, in 90 of the 175 cases volvulus and adhesions were the ætiological factors. Alterations of intraabdominal relationships occur at three periods in pregnancy (Wangensteen, 1942): (i) at the fourth to fifth month when the uterus is no longer a pelvic organ; (ii) at the eighth to ninth month when the head descends into the pelvis; (iii) during delivery and the puerperium. At these times bands and adhesions which normally were harmless can become tense and act as an obstructing medium. Obstruction of the intestine by external compression may occur throughout pregnancy. The bony boundaries of the pelvis account for the frequency of this type of obstruction, which is most often seen in the pelvic part of the colon, in the retroperitoneal part of the duodenum and in the terminal portion of the ileum. In three cases described by Eliason and Erb, pressure obstruction was present at the recto-sigmoid junction.

The characteroistic lack of smooth muscle tonus in pregnancy militates against the bowel's successfully overcoming any obstruction, whether by band or adhesion or by pressure from the enlarging uterus.

Diagnosis.

Recognition of the classical signs of intestinal obstruction is often delayed, as factors operating more or less normally in pregnancy, labour and the puerperium produce a somewhat identical picture. Constipation is almost universally present during pregnancy, owing to hormonic smooth muscle atonia. Nausea and vomiting likewise are common complaints from the fourth to the eighteenth week and sometimes even much later, and pain, of course, accompanies practically every labour. Too often the diagnosis of intestinal obstruction is missed, as the clinician considers the symptomatology as pathognomonic of normal pregnancy. Pyelitis of pregnancy is the diagnosis most popularly made, particularly since this disease is often accompanied by bowel atony, vomiting and abdominal pain. However, in pregnancy the pain of intestinal obstruction is characteristically in the epigastrium and griping or colicky in nature. In the series of cases at the Women's Hospital the clinical diagnoses made on the patients' admission to hospital were as follows: acute intestinal obstruction, seven cases; acute abdominal emergency, one case; pyelitis, two cases; *hyperemesis gravidarum*, one case; uterine hæmorrhage, one case; appendicitis, one case; pancreatitis, one case; leaking gastric ulcer, one case; twisted ovarian cyst, two cases; general peritonitis, one case; early labour, one case. The large number of diagnoses made does not tally with the number of cases—namely, ten. In most cases one or more diagnoses were made.

Age and Parity.

The ages of the patients were as follows: thirty, thirty-four, thirty-five, thirty-three, twenty-six, twenty-five, thirty-seven, twenty-two, thirty and twenty-nine years. Three patients were *primiparæ*, two had had one previous pregnancy each (one an ectopic pregnancy and the other a miscarriage). Of the five *multiparæ*, two had had pregnancies since the performance of an abdominal operation, the predisposing cause of the obstruction, and the remaining three had had no pregnancies since a previous abdominal section.

Previous Abdominal Operations.

The abdominal operations previously performed were as follows: appendicectomy, four cases; operation for ectopic pregnancy and removal of the appendix, one case; correction of retroversion and removal of the appendix, one case; operation for ectopic pregnancy, one case; appendicectomy and removal of an ovarian cyst, with cure of umbilical hernia, one case; cure of retroversion and removal of an ovarian cyst, one case. It will be noted that seven out of the nine patients had their appendices removed, and five out of the nine patients had operations on the uterus or its appendages. In one case no previous abdominal operation had been performed.

Latent Period.

The latent period between operation and the occurrence of obstruction was a variable factor, as the following statement shows: Case 40/5229: no previous operation. Case 43/3013: one pregnancy terminating in miscarriage intervened. Case 45/2154: latent period two and a quarter years; one pregnancy intervened. Case 46/3226: latent period seven years; one pregnancy intervened. Case 47/2798: latent period five years; patient a *primipara*. Case 47/2876: latent period two years; first pregnancy since operation. Case 47/4353: latent period two years; first pregnancy since operation. Case 47/5179: latent period two years, four months; first pregnancy since operation. Case 47/6955: latent period five years; first pregnancy since last operation; the patient had had two abdominal operations, fourteen and seven years previously. Case 48/46: latent period eighteen years; patient a *primipara*. Two patients (Cases 47/2876 and 47/6955) had had two and three previous operations on the abdomen; no pregnancy had occurred since the first of these operations.

Duration of Pregnancy.

Three cases of obstruction occurred in early pregnancy, at the seventh, twelfth and sixteenth weeks respectively. five occurred between the twentieth and thirty-second weeks at thirty-two, twenty-eight, twenty-six, twenty-four and twenty weeks respectively, one occurred at term and one occurred ten days *post partum*.

Period between Onset of Obstruction and Operation.

The period between the onset of the obstruction and operation was variable, the time factor depending on whether the obstruction was acute or subacute and on the rapidity with which the diagnosis was made. The longest period (Case 43/3013) was twenty-seven days—

the patient recovered. The next longest period was twelve days (Case 40/5299) and the patient recovered. In Case 46/3226 the period was six days, and the patient died. In Case 45/2154 the period was seventy-one hours and recovery followed. In Case 47/2798 the period was fifty-nine hours and the result was fatal. In Case 47/4353 the period was fifty-one hours and the patient died. In Case 47/6955 the period was forty-nine hours and recovery followed. In three cases (47/2876, 48/46, 47/5179) recovery followed operation within eight hours of the onset of symptoms.

Presenting Symptoms.

On admission to hospital the presenting symptoms of the ten patients were as follows: Case 40/3013: vomiting for one week; pregnancy terminated; then vomiting and abdominal pain and distension. Case 40/5229: abdominal pain, persistent vomiting and increasing constipation, all of twelve days' duration. Case 45/2154: suprapubic pain and vomiting, of twenty-four hours' duration. Case 46/3226: vomiting for one day. Case 47/2798: pain and vomiting, of twenty-four hours' duration and frequency of micturition of two months' duration. Case 47/2786: constipation of two days' duration, severe abdominal pain of four hours' duration and vomiting of two hours' duration. Case 47/4353: abdominal pain with vomiting, of twelve hours' duration. Case 47/5179: abdominal pain of forty-two hours' duration, vomiting of twenty-four hours' duration. Case 47/6455: Colicky abdominal pain and vomiting, of fourteen hours' duration. Case 48/46: colicky abdominal pain and vomiting, of five hours' duration. Common to all cases were the symptoms of continued abdominal pain and vomiting. The former was most characteristically colicky in nature, but was most often confused with ureteric or uterine colic. This stresses the importance of a detailed history when the patient is first examined.

Site and Nature of Constricting Lesion.

In eight of the ten cases the lower or terminal portion of the ileum was involved, and in the other two the obstruction was recorded as being present in the "small intestine". In all cases bands or adhesions were the constricting lesions.

Operations Performed.

In five cases the operation was simply the freeing of an adhesion or band; in one extra case Cæsarean section was performed in addition. In these cases the condition was diagnosed early, and of the six patients one died; in this case the obstruction occurred during labour. Three other patients had bowel resections; of these two had ileostomies performed and one died, and one had an end-to-end anastomosis and died. The tenth patient had her adhesions freed and a lateral anastomosis performed, with recovery. The necessity for resection and anastomosis or ileostomy arose only as a result of delay in diagnosis and operation. Of the three cases in which resection was performed, two patients died. The operation of freeing of adhesions or bands had a mortality rate of only one in six.

Management of the Pregnancy.

In only two of the ten cases was there direct interference with the pregnancy. In Case 40/3013 the diagnosis of *hyperemesis gravidarum* was made, and the seven weeks' pregnancy was terminated by curettage. The subsequent signs and symptoms of subacute intestinal obstruction made necessary an abdominal section. In Case 47/6455 the small bowel at term was adherent to the posterior wall of the uterus, which was adherent to the anterior parietal peritoneum. Cæsarean section was performed in order to expose the site of obstruction. In three cases—at twelve weeks, sixteen weeks' and twenty weeks' pregnancy respectively—the pregnancy carried on to term.

In two cases spontaneous termination of pregnancy followed operation; one patient, twenty-six weeks pregnant, went into premature labour and died two days subsequently; the other, twenty-four weeks pregnant, had a premature labour on the sixth post-operative day and recovered. The remaining patient was in labour on her admission to hospital, but also had a coincidental intestinal obstruction. The delivery was instrumental and the third stage was complicated by a manual removal. The operation (division of constricting bands) was performed forty-eight hours subsequent to parturition, but the patient died.

In general the policy has been one in which the pregnancy was not interfered with unless absolutely necessary. In only one case was there active interference, when a Cæsarean section had to be performed to expose the site of obstruction.

Summaries of Cases.

CASE 40/5299.—The patient, aged thirty years, and married for two years, had had no previous pregnancies or operations. She was admitted to hospital when approximately five months pregnant with a history of lower abdominal and epigastric pain, which was spasmodic and colicky, of twelve days' duration. Vomiting had been persistent. She had had increasing constipation. On her admission to hospital she was dehydrated and her abdomen was distended. The uterus could not be palpated; vaginal examination revealed no definite abnormality. She was operated on four hours after her admission to hospital and a small band was found in the wall of the small bowel. The band was released and the abdominal wall closed. The patient proceeded to a full recovery.

CASE 43/3013.—The patient, aged twenty-five years, had had one pregnancy fifteen months previously; she had miscarried at three months. She had had an operation previously for cure of retroversion and appendicectomy. She was admitted to hospital on June 21, 1943, when seven weeks pregnant, with a history of the vomiting of all fluids and solids for one week. The bowels had been open regularly. Her abdomen was distended, rather tense, but not tender. Despite treatment she vomited copiously until July 2, when her pregnancy was terminated by curettage. For the next nine days she continued to vomit, and on July 11 the abdominal pain was so severe and colicky, and the abdomen so distended and tense, that laparotomy for intestinal obstruction was performed. It was found that the small intestine was stenosed by bands and adhesions. These were divided and a lateral anastomosis of the bowel was performed. Her convalescence was uneventful.

CASE 45/2154.—The patient was twenty-two years old and three months pregnant, and had had one normal pregnancy eight months previously. She had been operated upon two and a quarter years previously for an acutely inflamed appendix, which had involved the right ovary and Fallopian tube. The appendix alone was removed. She was admitted to hospital on April 21, 1945, with a history of suprapubic pain gradually spreading to the epigastrium, and of vomiting attacks, of twenty-four hours' duration. On her admission to hospital, abdominal distension and some tenderness in the right iliac fossa were present. At 8.30 p.m. on March 23 she complained of considerable abdominal pain and had noticeable abdominal distension. Immediate laparotomy was performed, and multiple adhesions from the small intestine to the abdominal wall under the old scar were found, with a volvulus of a loop of the terminal portion of the ileum around the adherent loop, and partial obstruction. The adhesions were divided and the abdomen was closed. Her bowels opened on the third day and she was discharged on the nineteenth day after operation.

CASE 46/3226.—The patient, aged twenty-nine years, had been married for ten years, and had had two previous full-term pregnancies in 1935 and 1943. In 1939 she had had her appendix removed. On May 29, 1946, at 7.30 a.m., when approximately thirty weeks pregnant, she was admitted to hospital complaining of pain in the back recurring every ten minutes, of three hours' duration, and of vomiting of twelve hours' duration. She continued to vomit, and on May 31 and June 1 she was given dextrose-saline solution and serum intravenously. An enema returned hard, "constipated" fæces and flatus on June 1. She was delivered of a living female infant weighing three pounds eight ounces on June 1. The third stage was complicated by a post-partum hæmorrhage, manual removal of the placenta and post-partum shock, for which she was given one litre of serum and two litres of blood. On June 2 she was taking fluids and was not vomiting, and the Ryle's tube which had been in position since the beginning of labour was removed. Vomiting recommenced in the early hours of June 3, and at 9 a.m. her general condition deteriorated,

the abdomen being slightly distended. At 1 p.m. a Miller-Abbott tube was passed, and at 6 p.m. she was operated upon. Two bands were found causing an obstruction in the middle third of the ileum, and these were cut. After operation her condition deteriorated, and she died on June 4 at 3.45 a.m.

CASE 47/2798.—The patient, a *primipara*, aged thirty-five years, four and a half months pregnant, had had an appendicectomy in 1941. She was admitted to hospital on April 28, 1947, at 7.15 a.m., complaining of pain in the upper part of the abdomen and vomiting, of twelve hours' duration, and of frequency of micturation, of two months' duration. The pain was intermittent and colicky. On examination of the patient the abdomen was distended, and she was tender in both loins. She was considered to be suffering from pyelitis of pregnancy. On April 29 she had increased abdominal tenderness and her general condition was much worse. Her condition was variously considered to be accidental hæmorrhage, "appendicitis" (the appendix having been previously removed), pancreatitis, leaking gastric ulcer, pyelitis, and twisted ovarian cyst. Fifty-nine hours forty-five minutes after her admission to hospital, a gangrenous loop of the lower portion of the ileum, which was bound down in the pouch of Douglas, was resected and an end-to-end anastomosis performed. The patient's condition at the end of the operation was poor, and on May 1 she died of peripheral circulatory failure.

CASE 47/2876.—The patient was aged thirty-five years and had had two children, the first in 1942 and the second in 1945. Her previous operations had been for cure of retroversion and excision of an ovarian cyst in December, 1945, and for freeing of adhesions for intestinal obstruction in January, 1946. At the time of her admission to hospital in May, 1947, she was sixteen weeks pregnant, and complained of severe abdominal pain of four hours' duration and of vomiting of two hours' duration. Her bowels had not been open for two days. She said that the attack was identical with her previous attack of obstruction, and she presented the clinical picture of that condition. Laparotomy was performed and about eighteen inches of the terminal portion of the ileum were found to be gangrenous, from obstruction and torsion by a firm band. The bowel was resected and ileostomy was performed. In the ensuing weeks the ileostomy gradually closed, but she was not allowed out of hospital for several weeks after her normal confinement on October 20. She had been well since her discharge from hospital.

CASE 47/4353.—The patient was aged twenty-six years, and had had a left salpingectomy for ectopic gestation and appendicectomy two years prior to her admission to hospital. She was admitted at 8.30 p.m. on June 30, 1947, with a history of epigastric pain and vomiting of twelve hours' duration. On examination of the patient, tenderness was present in the upper part of the abdomen with muscle guarding, and tenderness in both loins. The uterus was enlarged to the size of a twenty-six weeks gestation. An enema was given with good result. On July 1 the diagnosis was: "? Pyelitis ? Acute abdomen." She was taken to the operating theatre on the evening of July 1 and ureteric catheterization was performed, and as urine flowed freely from the right ureter when the catheter had been passed two inches, she was returned to the ward. The following day she was vomiting intestinal contents and her abdominal distension had increased. Laparotomy was performed at 1.50 p.m., and two to three feet of the terminal portion of the ileum were found in the right iliac fossa, in the form of a volvulus held tightly by a band. The gangrenous bowel was excised and ileostomy was performed. Her condition was satisfactory for forty-eight hours, but on July 5 it deteriorated; at 12.30 p.m. she miscarried and at 3.40 a.m. on July 6 she died.

CASE 47/5179.—The patient, aged thirty years, had had two normal deliveries twelve and nine years prior to her admission to hospital, and an ectopic gestation in 1945. She was admitted to hospital at 7.30 p.m. on August 3, 1947, with a history of the sudden onset of severe colicky pain in the upper part of the abdomen forty-eight hours previously, and of vomiting of thirty-six hours' duration. Her bowels had not been open for forty-eight hours. On her admission to hospital she was dehydrated, and her abdomen was distended and generally tender, but without rigidity. Tumultuous borborygmi were present. The uterus was enlarged to the size of a twenty-four weeks pregnancy. She underwent an immediate laparotomy and multiple adhesions between adjacent loops of small bowel and the parietal peritoneum, which had obstructed the bowel, were divided. She had a stormy convalescence for one week, as she developed basal pneumonia and also miscarried on August 9. She was discharged from hospital on the twentieth day after operation.

CASE 47/6955.—The patient was aged thirty-four years, and this was her second pregnancy. Her first pregnancy was in 1933. She had had an appendicectomy in 1926, removal of a right ovarian cyst and adhesions in 1938, and cure of retroversion in 1942. She was in hospital during this pregnancy for short periods at the twenty-fourth, twenty-eighth and thirty-second weeks, with symptoms of subacute intestinal obstruction, which was relieved by conservative measures. She was admitted to hospital on October 9, 1947, at term, with a history of recurring colicky abdominal pain and vomiting, of fourteen hours' duration. The abdomen was distended and epigastric tenderness was present; an enema produced no result. She underwent abdominal section twelve hours after her admission to hospital, and numerous adhesions were found between coils of small intestine, which were adherent to the posterior wall of the uterus; this in turn was adherent to the anterior parietal peritoneum. Cæsarean section was performed to expose the site of the adhesions, which were separated. Resection of portions of each Fallopian tube was performed. She was discharged from hospital, well, on the twenty-sixth day after operation.

CASE 48/46.—A *primipara*, aged thirty-four years, the patient had been confined of a stillborn fœtus, delivered by the breech, at another hospital ten days prior to her admission to the Women's Hospital. She had had an appendicectomy at the age of sixteen years. She was admitted to hospital at 10 p.m. on January 2, 1948, with the history of the sudden onset of severe colicky epigastric pain at 5 p.m.; this had been followed by copious vomiting, which was still occurring. On her admission to hospital she appeared dehydrated, and generalized abdominal tenderness was present, more pronounced in the right iliac fossa. At 10.30 p.m. some abdominal distension was in evidence, and at 12.30 a.m. laparotomy was performed. A loop of distended, red, œdematous ileum was found to be obstructed by a tight band of adhesion extending from the ileo-caecal junction down to the base of the mesentery of the small bowel. She was discharged from hospital on the seventeenth day after operation.

Discussion.

The cases brought forward in this paper have all occurred in the eight year period to October, 1948. Prior to 1940 the records of the hospital do not disclose any case of intestinal obstruction complicating pregnancy, and the authors consider that, despite missed diagnoses and inadequate records up to 1940, the actual number of cases *per annum* has materially increased. This may well be the result of the great increase in pelvic and near-pelvic operations performed on young women in the past decade. A summary of 1000 consecutive out-patient cards of women attending the ante-natal clinic at the present time (August, 1948) showed that 343 had had their peritoneal cavity opened for some reason or another. The importance of this is seen when it is considered that nine out of the ten patients discussed in this paper had undergone a previous abdominal operation. The pregnant woman with an abdominal scar must always be considered a candidate for intestinal obstruction. The importance of early diagnosis cannot be too strongly stressed. The high mortality rate is due either to a missed diagnosis, or to the woman's reporting a long time after the onset of symptoms. The small intestine is most frequently involved, and any form of obstruction to this portion of the bowel invariably leads to early gangrene. If resection of the bowel has to be performed there is an increase in the mortality rate.

Half the cases occurred in the middle trimester of pregnancy, and the majority of the diagnoses made on admission to hospital indicated surgical intervention rather than expectant treatment. It is vitally necessary to exclude pyelitis early by adequate urinary examination. The authors also consider that consideration should be given to the use of X rays in helping to establish the diagnosis. There is no doubt, from a consideration of the results, that it would be far better for the patient if a laparotomy was performed rather than to waste valuable time on other methods for establishing the diagnosis. Intubation techniques, such as the passage of a Ryle, Miller-Abbott or Harris tube, are preferred as pre-operative measures rather than as forms of treatment.

No interference with the pregnancy is recommended unless it is necessary to expose the site of the obstruction.

Summary

1. Ten cases of intestinal obstruction complicating pregnancy at the Women's Hospital, Sydney, are presented.

2. The incidence is 0·34 per thousand confinements.

3. The importance of early diagnosis and operation is stressed.

4. The mortality rate in this series is three out of ten patients.

5. Five of the ten cases occurred in the middle trimester of pregnancy.

6. The condition, though rare, appears to be occurring more frequently and is so dangerous to the mother as to warrant every consideration.

Acknowledgements.

The authors acknowledge the help of the other members of the honorary medical staff of the Women's Hospital, Sydney, and thank them for their permission to use clinical records of their patients.

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Reviews.

CARDIO-VASCULAR DISEASE IN GENERAL PRACTICE.

THAT "Cardiovascular Disease in General Practice" should appear for review twice in three years is its own commendation.[1] A review is almost unnecessary.

We can commend this edition in similar terms to those expressed in our review of the previous edition. Though the book is basically for the general practitioner, both consultants and medical students will find points of importance to them in it. Its value to all three groups is maintained by the comment on recent advances in cardiology in the time which has elapsed since the last edition appeared. These remarks particularly apply to the treatment of thyreotoxicosis with thiouracil, and to the several comments throughout the book on the work of McMichael and Sharpey-Shafer on cardiac failure. Although the work of these two authors is still regarded as controversial, Dr. East's references to it fit well into their context and appear most convincing. The final separation in the chapter on pericarditis of adhesive pericarditis from constrictive pericarditis, each with a separate ætiology, will aid in the clarification of this somewhat confused subject.

It is difficult to indicate especially outstanding sections from the whole work. The chapter on congenital diseases of the heart remains an excellent one of its type, and the subsection on pregnancy and heart disease is of high standard. The final chapter on "Some Aberrations and the Normal Heart" is considered to be most essential in a book of this nature. The short article on thrombophlebitis and phlebo-thrombosis is most apt, and is concluded by a summarized account of the methods and dosage for anti-coagulation therapy.

The matters worthy of criticism are few. We are surprised to see oxygen therapy omitted from the section on the treatment of myocardial infarction; the impression persists, as in the previous edition, that venesection will benefit failure of the right ventricle only and not failure of the left. Many will not find themselves in agreement with the enthusiasm for exercise tolerance tests, but we feel that the statement on page 198, "naturally, a wide latitude is needed in interpreting the figures", puts the subject in its true perspective.

In a book of this kind, we feel that actual electrocardiographic tracings have little place, and congratulate the author on this continued omission. The existing figures are good, being largely drawings of the heart shadow with dotted variations of the departures from normal.

We would be inconsistent with our previous review were we not to repeat our plea for a short list at the end of each chapter of references for further reliable information.

[1] "Cardiovascular Disease in General Practice", by Terence East, M.A., D.M. (Oxon.), F.R.C.P. (London); Third Edition; 1949. London: H. K. Lewis and Company, Limited. 8¾" × 5½", pp. 222, with 34 illustrations. Price: 15s.

PSYCHODIAGNOSIS.

"PSYCHODIAGNOSIS: AN INTRODUCTION TO TESTS IN THE CLINICAL PRACTICE OF PSYCHODYNAMICS", by S. Rosenzweig, is designed to explain the purpose, materials, instructions, obtained data, scoring methods and interpretations of a representative group of psychological tests.[1]

The book is divided into five parts, this division representing the effort to demonstrate the steps of increasing complexity, the manner in which tests are used in psychodiagnosis. Part I is merely an introduction to the art of psychodiagnosis. Part II describes a series of tests, each illustrated by example from actual subjects. In Part III the integration of results from several test procedures is illustrated, and Part IV shows how the test approach can be combined with other essential data, particularly social history and psychiatric interviews for adequate diagnosis. The final part reviews the relationship of clinical psychology to general or experimental psychology.

The subject matter appears to have been well planned and well presented with numerous interesting case histories, illustrating tests for general intelligence, intellectual deviation, vocational aptitude and personality inventories, the test procedures demonstrating subjective and objective approaches as well as projective techniques.

The book should be of interest to the student and the practising clinical psychologist as well as to the medical practitioner and psychiatrist, far too many of whom are rather vague in the ideas of what the clinical psychologist does and how he does it.

The author attempts to show how the clinical psychologist, equipped with these modern tests, will not only be able to tell the psychiatrist all about the patient, but will also be able to plan and conduct the treatment for him. This latter desire, however, is likely to meet with opposition from many psychiatrists who, although appreciating the aid given by the clinical psychologist, prefer (and we think rightly) to plan and conduct their own treatments.

THE EMOTIONAL PROBLEMS OF CHILDHOOD.

MISS ZOË BENJAMIN is well and widely known as one of Australia's foremost educationists. In "The Emotional Problems of Childhood" she has given us the fruits of her study and experience with young people from the pre-school stage to adolescence.[2]

It is a sad commentary on the progress of educational thought in the community that it should be necessary for

[1] "Psychodiagnosis: An Introduction to Tests in the Clinical Practice of Psychodynamics", by Saul Rosenzweig, Ph.D., with the collaboration of Kate Levine Kogan, Ph.D.; 1949. New York: Grune and Stratton. 8½" × 5¼", pp. 398. Price: $5.00.

[2] "The Emotional Problems of Childhood: A Book for Parents and Teachers", by Zoë Benjamin, with a foreword by Professor H. Tasman Lovell; 1948. London: University of London Press, Limited. 7¼" × 4¾", pp. 296. Price: 8s.

a writer to stress at the outset the concept of education as development of the whole man into a balanced personality with a realization of his social responsibilities. Some may resent the forthright criticism of the methods which still prevail in most of our schools, but none can deny the evidence of faulty education seen in the lack of social responsibility and the poor standards of personal conduct in public and business life. It is shown how the responsibility for the attainment of better and happier community relationships is shared by the home and the school, while the problems of growth and adjustment need to be more fully understood by all who are in any way responsible for child guidance.

Surveys of the fundamental emotional urges and their characteristic expression in children of various ages have been presented by most writers on child development, but it is difficult to call to mind any who have been more successful in the application of sound psychological principles to the practical problems which beset all parents and children at some time or other.

The causes of the many forms of maladjustment shown by children are thoroughly examined, and in each case the treatment suggested is constructive and positive, but very often needs to be applied not to the children but to parents and teachers, who are the victims of maladjustment in a previous generation. This is particularly true in the case of the nervous child, who is much in need of a well-balanced home life, but is all too often merely the product of unstable environment.

The characteristic difficulties of adolescence are handled with insight and understanding, but the author is not one of those who confuse liberty with licence, and the emphasis on social responsibility rather than on personal indulgence would make strong appeal to the natural altruism of youth.

Notes on Books, Current Journals and New Appliances.

EARLY RECOGNITION OF DISEASE.

A USEFUL volume dealing with the early recognition of disease has appeared as one of "The Practitioner Handbooks".[1] As the late Sir John Fraser points out in the introduction, the earlier a change is recognized, the greater are the chances of correcting the error. The articles in this book which cover a wide range are by well-known writers, and have appeared in the pages of *The Practitioner*. They will help the practitioner to avoid an attitude of *laissez-faire*, which Fraser declares should be avoided at all cost.

A MANUAL OF PRACTICAL BIOCHEMISTRY.

IN the preface of his "Manual of Practical Biochemistry",[2] Professor Mark Mitchell explains that the book has been designed primarily for medical students during their course in biochemistry at the University of Adelaide. The purpose of the work is partly to illustrate the theoretical aspects of the subject and partly to teach manipulative proficiency. Some experiments needed to support theory are time-consuming and require elaborate techniques and are unsuited to individual performance by members of a large class within a routine period. The author states that all the exercises in his book can be done by every student without elaborate equipment. The book is divided into two parts, the first dealing with qualitative analysis and the second with quantitative analysis. The book is set in two kinds of type—large and small. The larger type is used for the description of the different procedures and the smaller for explanatory notes on the tests. The book is interleaved so that the student may make his own notes as he progresses along the biochemical path. It appears that everything is done in this work to make the student's progress as easy as possible.

[1] "Early Recognition of Disease", edited by Sir Heneage Ogilvie, K.B.E., D.M., M.Ch., F.R.C.S., and William A. R. Thomson, M.D.; 1949. London: Eyre and Spottiswoode (Publishers), Limited. 8½" × 5½". Price: 10s. 6d.

[2] "Manual of Practical Biochemistry for Medical Students", by Mark L. Mitchell; 1949. Adelaide: The Hassell Press. 8¼" × 5¼", pp. 202.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"A Short Practice of Surgery", by Hamilton Bailey, F.R.C.S. (England), F.A.C.S., F.I.C.S., F.R.S.E., and R. J. McNeill Love, M.S. (London), F.R.C.S. (England), F.A.C.S., F.I.C.S.; Eighth Edition; Part V; 1949. London: H. K. Lewis and Company, Limited. 8½" × 5½", pp. 252, with 202 illustrations, of which 11 are coloured. Price: £2 12s. 6d. the set. Not sold separately.

Deals with injuries and diseases of bones, joints, muscles, tendons and bursæ; also with deformities.

"Canned Foods: An Introduction to their Microbiology", by J. G. Baumgartner, foreword by W. Clayton, D.Sc.; Third Edition; 1949. London: J. and A. Churchill, Limited. 7½" × 4¾", pp. 288, with 32 illustrations. Price: 15s.

The author's object is to present a short account of the principles involved in the processing of canned foods, to indicate the common causes of spoilage and the means by which they can be controlled.

"Food Inspection Notes: A Handbook for Students", by H. Hill, F.R.San.I., F.S.I.A., A.M.I.S.E., and F. Dodsworth, M.R.San.I., M.S.I.A.; Third Edition; 1949. London: H. K. Lewis and Company, Limited. 6½" × 4¼", pp. 140. Price: 7s. 6d.

The third edition of a book reviewed in this journal in February, 1948.

"Hamlet and Œdipus", by Ernest Jones, M.D., F.R.C.P.; 1949. London: Victor Gollancz, Limited. 8½" × 5½", pp. 170. Price: 12s. 6d.

Addressed to the "educated public".

"Text-Book of Ophthalmology", by Sir W. Stewart Duke-Elder, K.C.V.O., M.A., D.Sc. (St. And.), Ph.D. (Lond.), M.D., Ch.B., F.R.C.S., Hon. D.Sc. (Northwestern), Volume IV; 1949; The Neurology of Vision; Motor and Optical Anomalies. London: Henry Kimpton. 9½" × 6½", pp. 1184, with 1080 illustrations, some of them coloured. Price: £3 10s.

Two further volumes are in preparation.

"The Sulphonamides in General Practice", by Edward D. Hoare, M.D.; 1949. London: Staples Press, Limited. New York: Staples Press Incorporated. 6½" × 4", pp. 94. Price: 5s.

An attempt to indicate briefly under what conditions the sulphonamides can be expected to be of value, the dangers attendant on their use and how they may be avoided.

"Conference on Metabolic Aspects of Convalescence: Transactions of the Sixteenth Meeting", edited by Edward C. Reifenstein, junior, M.D.; October 27-28; 1947. New York: Josiah Macy, Junior, Foundation. 9" × 6", pp. 168, with 39 illustrations. Price: $3.00.

A *verbatim* record of the discussions.

"Conference on Metabolic Aspects of Convalescence: Transactions of the Seventeenth Meeting", edited by Edward C. Reifenstein, junior, M.D.; March 29-30; 1948. New York: Josiah Macy, Junior, Foundation. 9" × 6", pp. 248, with 79 illustrations. Price: $4.00.

A *verbatim* record of the discussions.

"The Mental and Physical Effects of Pain", by V. C. Medvei, M.D., M.R.C.P.; 1949. Edinburgh: E. and S. Livingstone, Limited. 7" × 4½", pp. 60. Price: 3s.

The Buckston Browne Prize essay, Harveian Society of London, 1948.

"A Companion in Surgical Studies", by Ian Aird, Ch.M., F.R.C.S.; 1949. Edinburgh: E. and S. Livingstone, Limited. 9½" × 7", pp. 1072. Price: 63s.

Intended to serve as a "kind of commentary to the clinical illustrations which the ward and operating-theatre afford".

"Diseases of the Warm Climates: Their Clinical Features, Diagnosis and Treatment", by Albert Dubois, M.D., and Louis Van Den Berghe, M.D., D.Sc.; 1948. London: William Heinemann (Medical Books), Limited. 9" × 5¾", pp. 468, with 100 illustrations. Price: 42s.

Addressed to practitioners in the tropics and to those in temperate climates who see patients from tropical areas.

"Illustrations of Surgical Treatment: Instruments and Appliances", by Eric L. Farquharson, M.D., F.R.C.S. (Edinburgh), F.R.C.S. (England), with a foreword by the late Sir John Fraser, Bt., K.C.V.O., M.C., M.D., Ch.M., F.R.C.S. (Edinburgh); Third Edition; 1949. Edinburgh: E. and S. Livingstone, Limited. 9¾" × 5¾", pp. 408, with 61 illustrations. Price: 25s.

An attempt to illustrate by photographs practical methods of surgical treatment rarely covered in text-books on general surgery.

The Medical Journal of Australia

SATURDAY, AUGUST 27, 1949.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

SOCIAL BIOLOGY.

BIOLOGY is defined in the "Concise Oxford Dictionary" as the "science of physical life, dealing with the morphology, physiology, origin and distribution of animals and plants". When, therefore, we speak of social biology we refer to a science dealing with the structure and so on of human society. Sybil Neville-Rolfe, O.B.E., defines social biology[1] as "the study and application of the biological sciences directed to the development and conservation of natural resources in the service of the human race, to the improvement of human quality and welfare, and to the clarification of fundamental truth to which man's behaviour must be related". Accepting this definition, we must realize at once that social biology is a subject to which every intelligent man or woman in the community should direct his or her attention. No one in any civilized country needs to be told that, though the war is over, discord still prevails. Nicolas Berdyaev puts it bluntly that the world is poisoned by hatred. He sees in the present discordant state not a political or economic phenomenon, but something moral and spiritual, which reveals the internal condition of human society.[2] Whether Berdyaev is entirely correct in his statement need not be discussed at the moment. That so profound a thinker and so eminent a philosopher can state such a view and base an important book on it serves but to emphasize the urgency of the subject. It has for this reason appeared appropriate to give unusual prominence to Neville-Rolfe's book, rather than to deal with it in the review columns.

This book, which we hope to show merits a wide circulation, is in some ways unusual. To begin with, the author in the foreword confesses to some diffidence in having produced it. The fact is that few women have studied with such diligence the subjects with which the book deals and few therefore can write with such authority. This brings us to the next point—that the first forty pages are given over to an introduction comprising "Autobiographical Notes". This is most useful and shows the range of the author's study. About 250 pages are devoted to the book proper, and 104 pages close the volume as a "Handbook Appendix on Social Problems", comprising a summary of the present administrative, social and statistical position in different spheres. The author was the eldest child of Lieutenant Cecil Burney, R.N., and Lucinda Marion, his wife. She must have been a serious-minded child, for at sixteen years of age she chanced to read a book on prostitution and resolved to "do something about it". Before she was twenty years of age she married a naval officer, Arthur Gotto, who was killed in a coaling accident. In 1917 she married Lieutenant-Commander Clive Neville-Rolfe, R.N. Soon after Gotto's death, while still only twenty years of age, our author declared that her work in life was to "study prostitution and venereal disease and try to get rid of them". Her common sense and her practical attitude of mind are best shown by her refusal to accept the measures that were being adopted to rescue "fallen" girls. She became attached to a rescue home run by Anglican Church sisters. She had been with this body only a short while when she was invited to join the staff over the evening tea to be taught the principles of rescue work. She writes of this: "Indignation outran discretion, and instead of meekly learning, I unfortunately attacked the policy of the work—root and branch." No member of the staff had any knowledge of physiology or of the mechanism of mating and reproduction. The girls who had to be rescued were emotionally unbalanced, as would be expected, and were steeped in an emotional religious atmosphere. To prevent the exchange of "unfortunate" experiences, they were forbidden to talk to each other. They were not trained for any gainful occupation. Our author-to-be heard that these girls after two years in the home could get a post as general servant at £24 a year. She asked a question which was considered most improper: "How much can they earn in prostitution?" The "kindly and masterful" lady at the head of affairs sent for her and with a twinkle in her eye suggested that outside work would be more suitable. So her work began and she later did not cease to press for a scientific and objective approach to the problem, and for those employed in social work to be equipped with adequate training, which included a thorough grounding in the biological sciences. Today Mrs. Neville-Rolfe is vice-president of *L'union internationale contre le péril vénérien* and she was honorary secretary and secretary-general of the British Social Hygiene Council from 1914 to 1944. She has taken part in other organizations concerned with social welfare.

In discussing social biology as such the author shows that the family is the yard-stick common to all cultures to measure the advance or recoil in human welfare resulting from social and economic changes and to furnish a set of values which will provide understanding of progress. Here she discusses mixed marriages (the union of parents of different races) and also the child born out of wedlock, and she makes a strong plea for the teaching of biology. If world-wide measures to foster human welfare are to be effective, the understanding of the biological sciences should be widely generalized in all cultures. Perhaps the most important chapter in the book deals with values. She declares that the task of leaders of this

[1] "Social Biology and Welfare", by Sybil Neville-Rolfe, O.B.E.; Chapter VIII contributed by A. E. W. McLachlan, M.B., Ch.B. (Edinburgh), D.P.H., F.R.S. (Edinburgh), together with "A Handbook-Appendix on Social Problems" edited by Ethel Grant, M.B.E.; 1949. London: George Allen and Unwin, Limited. 8½" × 5½", pp. 416. Price: 21s.

[2] Nicolas Berdyaev, "Towards a New Epoch", 1949. (Translated from the French edition *"Au seuil de la nouvelle époque"*, 1947.)

generation is to promote objectively grounded values with sufficient appeal to motivate human conduct. The trouble is that there is a cleavage between the outworn emotionally rooted values and factual knowledge, and this is creating instability of character. As each culture in turn adopts social customs in relation to new knowledge it should be possible to promote certain objectively based values that will appeal to the educated followers of all religions. It is, the author asserts, on the capacity to do this that effective international cooperation in the field of human welfare depends. The newer concepts of social biology need to be integrated with the emotionally rooted values of the major religions. If principles are to be interpreted and gaps are to be closed, it is necessary to understand how values arise, what values now motivate conduct in each community, and where the values run contrary to objective truth. The author discusses these points. There is no doubt that if man is to express the whole force of his personality in the service of his ideal, this ideal must satisfy both the intellectual and the emotional self at whatever degree of development both may be. One of the most important questions that arises in this regard is the attitude of young people of today. Fashion is the stumbling block. The author writes clearly on this point. To fashion may be added mental inertia. The effects of fashion and inertia are seen on every hand in this country and there is no reason to suppose that other countries are different from our own. If fashion is to be combated—if young men and women are to study and to fit themselves to live a life commensurate with their talents—a new fashion has to be created. To rail against the present fashion is useless—the older folk would do the railing and youth would answer with thinly veiled contempt, perhaps with contempt *sans* veil. An indirect stimulus must be provided and this will challenge the ingenuity of a prophet. The author looks to religious teachings, but thinks that they have to be reinterpreted in the light of factual knowledge based on the study of science.

The author's section of the book, that preceding the "Handbook Appendix", concludes with a chapter on the current problems of social hygiene. Here various subjects are mentioned, including such controversial topics as artificial insemination. One point that should be mentioned is the contention that in the endeavour to make medical care available to everyone without financial barriers there is an acute danger that the cure and not the prevention of disease will be emphasized even more than it is today. Again, the fact that the State is becoming an employer of increasing numbers of persons means to the author that many persons are subjected to intellectual sterilization and are deprived of the power of initiative. Almost the concluding statement is that personal freedom and the good life for all are the avowed objective of the democracies, but that the implications in relation to an industrial and international economy are undefined because they are not clearly visualized. "Political policies at variance with biological facts and a dawning of new economic perceptions are confusing the issues." The author can suggest trial and error as the only steps to be taken and she holds that these should be taken in the light of biological, economic and historical knowledge. The whole question for each individual depends on his or her motive—on what he wants to make of himself and so of the community in which he lives, and why. It is no use to wrap the talents in a napkin as the man in the parable did—talents are given to be used.

Current Comment.

DEXTRAN: AN EXPERIMENTAL PLASMA SUBSTITUTE.

WHOLE BLOOD AND PLASMA have come to be widely used in the treatment of surgical shock and hæmorrhage with notable success. Various substances have been suggested and tried as substitutes, including acacia, pectin and gelatin, but have proved unsatisfactory, mostly because the substances are of the nature of foreign bodies. For some years now, investigations have been going on in Sweden into the use of dextran as a plasma substitute. Dextran is a polysaccharide composed essentially of a great number of molecules of glucose linked in long chains and having a molecular weight of many millions. By carefully controlled partial hydrolysis, a modified form of dextran is obtained which has a non-uniform molecular weight of between 100,000 and 200,000 and passes through capillary walls slowly. It is this modified dextran in a 6% solution which has been proposed as a plasma substitute by Grönwall and other workers in Sweden. It has been used extensively in that country both in laboratory experiments and clinically, apparently without ill effects and with satisfactory therapeutic results. The first report which we have seen of its clinical use outside Sweden is in a paper by F. P. Turner, B. C. Butler, M. E. Smith and J. Scudder,[1] from the Surgical Pathology Laboratory of the College of Physicians and Surgeons, Columbia University, and the Department of Surgery of the Presbyterian Hospital, New York. These workers report that thirty volunteers, patients at the Presbyterian Hospital and none of them seriously ill, were given infusions of macrose solution, a 6% solution of partially hydrolysed dextran. A considerable number of undesirable effects were observed. In ten cases anaphylactic or anaphylactoid reactions occurred, and in all cases a striking increase in the sedimentation rate was noted. These reactions Turner and his colleagues believe to be specifically related to the molecular structure of the dextran molecule and its concentration in the plasma. A possibility exists that some undiscovered impurity was present in the solution used, but they feel that the weight of the evidence incriminates the dextran molecule itself. Studies were carried out on the plasma sodium, potassium, chlorides and carbon dioxide, but no great changes in the levels of the various blood electrolytes were found following the administration of dextran solution. Satisfactory hæmodilution and increase in plasma volume were noted after the infusion, the effect persisting for twenty-four hours. In animal experiments plasma proteins were found to regenerate rapidly after exsanguination and replacement of the blood lost with macrose solution. Post-mortem studies on six dogs who received macrose solution in large quantities revealed focal degenerative lesions in the liver and kidneys and minimal reticulo-endothelial hyperplasia in the spleen. The comment is made that some of these changes are not reversible, but were minimal and only focal in nature. In comparison with the Swedish work, in which no pathological alterations in the tissues were observed, the amount of macrose solution used in the animal experiments was relatively high. It would appear that in general the absence of untoward reactions reported from Sweden has not been confirmed in the investigations at the Presbyterian Hospital, but it would be unwise to draw too extensive conclusions from one series, especially when the same batch of solution was used for all members of the series. Further investigation is indicated.

The attributes of an ideal plasma substitute have been worked out by a number of workers. Taylor and his

[1] *Surgery, Gynecology and Obstetrics*, May, 1949.

colleagues summarize these attributes and comment that a 6% solution of partially hydrolysed dextran possesses many of them but not all. One striking deficiency is dextran's long and highly symmetrical molecular structure, which causes amongst other things the increase in sedimentation rate. The question whether partially hydrolysed dextran is toxic or antigenic cannot be finally answered on present information. It is possible, but by no means proved, that dextran is slowly broken down to glucose and then metabolized. If this was so, it would be an additional advantage to the plasma-substitute properties and would probably resolve most of the fears of ill effects. It has yet to be proved or disproved. The possibilities are interesting, but judgement must be reserved.

ANALEPTICS.

RESTORATIVE DRUGS are of great practical importance, especially in these days of barbiturate therapy and anæsthesia, but many practitioners would confess that their knowledge of individual drugs of this type is vague or empirical. Some drugs have achieved a reputation which will not stand close scrutiny, but they maintain their position by tradition. A practical help in clarifying the position is "A Status Report on Analeptics", which has been prepared by J. E. Eckenhoff, C. F. Schmidt, R. D. Dripps and S. S. Kety; its publication has been authorized by the Council on Pharmacy and Chemistry of the American Medical Association.[1] The report states that "an analeptic may be defined as a drug capable of stimulating the normal central nervous system and which is used for the purpose of overcoming a depression of that system". It is good that the statement is that an analeptic "may be" defined, as that allows us to squirm at the literary quality of the definition while not quibbling at its pharmacological adequacy. It is pointed out that analeptics have not proved to be infallible when used in the treatment of central nervous system depression. This may mean that the drugs now available for this purpose are deficient in important respects and that intensive search is indicated for other agents which would produce superior clinical results, or it may mean that the available analeptics are capable of doing practically everything that can reasonably be expected of drugs of this type. If the second of these alternatives is true, the report points out, further improvement in the management of the unconscious patient would depend on other measures based on a fuller knowledge of the underlying derangements. In an attempt to assess the present status of analeptics a most important consideration becomes an understanding of what such drugs may be expected to accomplish. This demands an inquiry into the nature of the changes which underlie unconsciousness or coma, as encountered clinically, and the manner in which analeptics affect these abnormalities. These questions Eckenhoff and his colleagues have considered and discuss at some length. They state that the common underlying mechanism in all severe depressions of the central nervous system appears to be an interference with the complex metabolism of nerve tissue. The integrity of this metabolic process depends on at least two conditions: first, the homœostasis of the cellular environment, which means the maintenance of a constant and optimal concentration of available oxygen, glucose, carbon dioxide, hydrogen ion and many other substances, and second, certain intracellular mechanisms for the proper conversion of energy. Failure of homœostasis follows, firstly, changes in composition of the arterial blood due to lack of available oxygen and/or accumulation of carbon dioxide or to lack of available nutrient material (glucose primarily); secondly, it follows failure in cerebral circulation due to general circulatory derangements or to local circulatory disturbances. Failure in intracellular metabolism follows, firstly, lack or destruction of certain intracellular enzyme systems, as occurs in some deficiency diseases, and secondly, the action of noxious substances, either endogenous, as in acidosis, ketosis and uræmia, or exogenous, as narcotic or other drugs. The opinion is expressed that depressions caused by narcotic drugs are the most amenable to analeptic drugs. It is probable that the actions of the two types of drugs are intimately related, the most likely relationship being one of physiological antagonism. The explanation of this antagonism depends on knowledge of the cause of the narcotic depression, which is still obscure. Eckenhoff and his colleagues discuss this question from various points of view, but it is still unsolved; further work on the subject is needed urgently if an understanding is to be obtained on the important practical issues involved.

The drugs now in use as analeptics are grouped into four categories. The first comprises those which have a primary stimulant action on the nervous system and the value of which depends on that action; such are picrotoxin, "Metrazol", nikethamide ("Coramine"), strychnine, caffeine and atropine. Drugs of the second group are those whose analeptic effects are due to reflexes from one source or another; such are α-lobeline and irritants of the nose, mouth, stomach and subcutaneous tissues. In the third group are drugs which stimulate both the central nervous system and the cardio-vascular system, their analeptic effects presumably depending not only on direct stimulation of nerve cells, but also on increase of the blood supply to the brain; included are sympathomimetic drugs, especially those with a relatively strong stimulant action on the central nervous system and a relatively weak sympathomimetic effect, such as amphetamine ("Benzadrine"), d-amphetamine ("Dexedrine") and desoxyephedrine ("Methedrine"). Substances of the fourth group exert a specific stimulant effect on nerve tissue by entering directly into the biochemical reactions on which the excitability of the tissue depends; these include certain intermediate products of carbohydrate metabolism, as well as the components of the vitamin *B* complex. In their evaluation of the individual drugs Eckenhoff and his colleagues conclude that picrotoxin and "Metrazol" are the most valuable analeptics obtainable today, picrotoxin being the most potent according to the findings of laboratory research. Picrotoxin is also more dangerous and should be used only in the treatment of deep depressions, more particularly those due to the barbiturates, and then by someone well versed in its actions; otherwise it is not the drug of choice. Nikethamide is apparently inferior to picrotoxin or "Metrazol" as an analeptic agent in the treatment of barbiturate and most other depression states. Many claims have been made of its value, but the report regards them as largely unwarranted. It may, however, be helpful in the treatment of mildly depressive states, such as those caused by "Avertin" and the short-acting barbiturates, and possibly also morphine depression. The value of amphetamine and other sympathomimetic amines is not yet clear; the report recommends that their use alone as analeptics should be reserved until further data are forthcoming, but that their administration may profitably be combined with that of "Metrazol" or picrotoxin. There seems to be insufficient reason for the use of strychnine as an analeptic. Caffeine is ineffective *per se* as an analeptic in the treatment of moderate or deep narcosis; it can be most effectively used as an adjunct to other analeptic agents. Camphor and atropine as stimulants are regarded as obsolete, and α-lobeline is not recommended since better drugs are available.

These are the main conclusions of a report which does not lend itself readily to summarizing; those interested should read it for themselves, though they will probably be more impressed from the detailed report than from this brief account with the fact that a great deal remains to be learnt about analeptics. One point is, however, clear: analeptics should not be expected to work miracles. Such knowledge as we have of their rational use should be applied and other measures must not be neglected. Anoxia and asphyxia, for example, would not appear to be indications for the administration of analeptics, and the use of analeptics in the treatment of depressions should be only a part of a carefully integrated schedule of treatment including oxygen therapy, the administration of pressor drugs and fluid, and pulmonary ventilation if necessary, as well as the administration of more than one analeptic if indicated.

[1] *The Journal of the American Medical Association*, March 19, 1949.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

The Growth Cycle of Influenza A.

L. HOYLE (*The British Journal of Experimental Pathology*, October, 1948) has studied the growth cycle of influenza virus A and the relations between virus, soluble antigen and host cell in fertile eggs inoculated with influenza virus. It was shown that after inoculation of the infective material which could agglutinate red cells, it disappeared from the allantoic fluid and was taken into the cells lining the allantoic sac; these cells were non-infective, and for a period of six hours no substance which would agglutinate red cells could be recovered. This non-infective form multiplied during this period, and then the infective form again appeared in the allantoic fluid, further cells became infected, and the cycle was repeated. The author states that the soluble antigen is present in the membrane when the intracellular non-infective form is present, and so the soluble antigen may be identical with the intracellular phase of the virus.

Role of the Wax in Tubercle Bacilli.

SIDNEY RAFFEL AND JOHN E. FORNEY (*The Journal of Experimental Medicine*, October, 1948) began a study of the role of the wax of the tubercle bacillus in establishing delayed hypersensitivity by examining hypersensitivity to a simple chemical substance, picryl chloride. They define hypersensitivity towards a protein antigen as being immediate, productive of antibody response, and transferable by injection of the serum into a normal animal, the reaction being exhibited by a particular tissue. The tuberculin type reaction is delayed for several hours, no antibody is formed, the sensitivity is not transferable by serum, and all tissues appear to be equally reactive. Previous work by the senior author has shown that if the protein fraction of the tubercle bacillus is injected, immediate sensitivity results, but if the wax fraction is also added, the delayed type occurs and persists. It was decided to study the effect of combining the wax with a simple antigen, and picryl chloride was chosen. It was found that this substance alone administered through the skin, after repeated doses, could produce a mild delayed hypersensitivity, but if administered intraperitoneally, it did not do so. However, if the wax of the tubercle bacillus also was administered intraperitoneally, after a single dose, pronounced delayed hypersensitivity did develop and persist. No Arthus phenomenon could be demonstrated, and the antibody response to picryl chloride was not affected by the presence or absence of the wax. Passive transfer experiments were attempted by injecting serum of reacting animals into normal animals and later by testing them with the combined antigen. No response was obtained. It could also be shown that the reactive state was independent of the anaphylactic state. Attempts were made to define the mechanisms of action of the wax. If it was injected at a different time and place from the picryl chloride, no sensitivity developed. If the wax was applied to the surface of the skin, the reactivity developed was only mild, little more than if picryl chloride was used alone. Finally, in experimental tuberculosis in guinea-pigs, application of picryl chloride to the skin in the early stages appeared to demonstrate hypersensitivity earlier than it was evident in other animals in the group without picryl chloride. It is suggested that this response is not "hetero-allergic", but the result of the tendency of the wax portion of the tubercle bacilli to cause tissues to respond with the tuberculin type reaction to a variety of substances. The authors suggest that a lipid in the skin may be involved in the mild reactions of delayed type produced when picryl chloride alone is applied to the skin.

Transportation of Anaphylactogenic Property by Eosinophile Cells.

Z. Z. GODLOWSKI (*The British Journal of Experimental Pathology*, December, 1948) has investigated the possible function of transportation of anaphylactogenic property by eosinophile cells. He used the specifically sensitized guinea-pig uterus according to the Schultz-Dale technique, in which the two horns of the uterus can be used separately, one for a control response to the specific antigen used for sensitization, and one for a response to the substance under test. Antigenic extracts of eosinophile cells were prepared from peritoneal exudate of anaphylactic animals, in which the eosinophile-cell content of this fluid was high, and control exudates from non-anaphylactic animals with no eosinophile cells in the exudate. When the eosinophile-cell antigen was used, a measurable response was obtained which was not exhibited by cellular extracts from other leucocytes. The suggestion that the eosinophile cells liberated histamine was not borne out by the finding that non-anaphylactic eosinophile-cell antigen did not cause contractions in the sensitized uterine muscle. The author concludes that transport of antigenic material must be one function of the eosinophile cell; his experiments were not designed to show that this function was the main or the only function it possessed.

Studies with Shigella Dysenteriæ.

SARA E. BRANHAM AND SAIDE A. CARLIN (*The Journal of Infectious Diseases*, July-August, 1948) began a series of studies of *Shigella dysenteriæ* with a record of the action of infection with the organism and of its toxin in mice. The organisms were injected into the peritoneal cavity, and it was found that typical illness resulted in the death of the animals in forty-eight hours. When bacteria-free toxin was injected, death occurred later and paralysis appeared before death. The appearances of the intestine, mesenteric glands, gastro-intestinal tract and brain were recorded. The second study records the results of the use of serum, both antibacterial and antitoxic, on the experimental infection and intoxication in mice. It appeared that the antibacterial serum if given sufficiently early in the infection reduced the mortality very considerably in groups of mice. Antitoxin on the other hand influenced very little the course of experimental infection or intoxication. As a prophylactic agent, given before the infecting organism, antitoxin produced a passive immunity lasting three weeks. The antitoxin protected against a relatively large amount of toxin. The authors point out the readiness with which Shiga toxin affects the nervous system and suggest that this is the reason for the poor results in treatment of intoxication with the antitoxin.

Salmonella Types in the United States of America.

P. R. EDWARDS, D. W. BRUNER AND ALICE B. MORAN (*The Journal of Infectious Diseases*, November-December, 1948) have reported the results of further studies on the occurrence and distribution of Salmonella types in the United States. Over 12,000 strains were identified in animals and man. *Salmonella typhi-murium* was found more frequently than any other strain, this indicating an absence of host specificity; all warm-blooded animals were infected. It was noted that *Salmonella choleræ-suis* was an extremely invasive organism, found by blood culture and in relation to fatal illness more often than any other strain. A very large proportion of cultures were isolated from young subjects both human and animal. The ecology and environmental influences in the spread of Salmonella types are discussed.

Cell Blockade in Newcastle Disease.

F. B. BANG (*The Journal of Experimental Medicine*, February, 1949) has studied the "interference phenomenon" or cell blockade in Newcastle disease of chickens and chicken embryos, in order to observe the effect of the presence of particles of one strain or species of virus on the pathogenic activities of another. It was found that irradiated virus suspensions treated sufficiently to remove their infectivity, when inoculated onto the chorio-allantoic membrane, would prevent the development of lesions by living virus inoculated thirty minutes later, thus blocking its action; but this activity was not complete, because larger doses of the active virus could produce infection, or, if the inoculum was placed in the allantoic sac, infection developed. Swine influenza or human A influenza could also block the action of Newcastle virus, but larger doses of Newcastle virus could overcome the blocking action. Avirulent Newcastle virus could also block the effect of virulent virus if the two were inoculated together. The author suggests similarities between antibiotic action and blocking effects by non-infective virus particles.

HYGIENE.

Tuberculin, Coccidioidin, and Histoplasmin Sensitivity.

F. H. RICE AND R. V. SLATTERY (*Public Health Reports*, January 7, 1949) report the results of a survey of 6000 students at the University of Chicago for skin sensitivity to tuberculin, coccidioidin and histoplasmin, administered intracutaneously in 0·1 millilitre doses, in relation to pulmonary calcifications shown on a 70 millimetre chest X-ray film. A skin reaction was considered to be "positive" if the resulting indurations measured five millimetres in diameter. Erythema was disregarded. It was found that

among this group of diverse origin the prevalence of tuberculin sensitivity progressively increased from 10% among the youngest age group to 57% among those fifty years of age. The highest rates were among Chinese male students; of these 95% reacted to tuberculin and 30% had areas of calcification in their X-ray films. The rate of histoplasmin sensitivity began at 10% among the youngest group and reached 38% in the oldest group. Pulmonary calcifications were associated with histoplasmin sensitivity twice as frequently as they were with tuberculin sensitivity. The incidence of both histoplasmin sensitivity and pulmonary calcifications was highest in the Lower Mississippi Basin of the United States. A total of 4% of the students reacted to coccidioidin. The highest rates were found in students from the south-western part of the United States, which contains areas endemic for coccidioidomycosis, and from the three middle western States.

Poliomyelitis Virus in Flies.

JOSEPH L. MELNICK (*The American Journal of Hygiene*, January, 1949) undertook the isolation of poliomyelitis virus from single species of flies collected during an urban epidemic in Rockford, Illinois. No special attempt was made to obtain flies from areas in which cases of the disease occurred. Extracts of the flies were inoculated into both cynomolgus and rhesus monkeys. During the epidemic there were 88 cases of poliomyelitis, and virus was isolated from five different varieties of flies; it was noted that virus was not necessarily found in the fly which was numerically predominant. Only one species appeared to show virus for any length of time, namely, *Phormia regina*. Virus appeared in the cooler months in a winter fly, *Cynomopsis cadaverina*, and the author suggests that this insect may constitute a reservoir for the virus during winter months. He insists that these results be viewed as a study of factors observed in a single small oubreak, and not necessarily of general application.

Physiological Effects of Industrial Solvents.

J. H. FOULGER (*The Journal of the American Medical Association*, March 26, 1949) discusses the effects of industrial solvents. He states that the use by the public of synthetic detergents, paints, lacquers, paint and stain removers, window cleaners and many other solutions containing toxic industrial solvents without the adequate precautions of organized industry, may introduce new and unexpected health hazards into the home. He discusses the properties of solvents that make them useful in industry and in the home, and their toxic effects on human beings. Solvents may remove natural fats and oils from the skin, leaving it dry and cracked, in addition to producing severe chemical burns, or they may be absorbed into the general circulation through the skin. The author then discusses the factors affecting the absorption and removal of the vapours of toxic solvents through the lungs. In regard to the chemical constitution of solvents, he states that there is no relationship between chemical structure and pharmacological action. The early effects of toxic solvents are similar in type and are probably due to interference with tissue respiration producing an inability of the tissues to use effectively the oxygen supplied to them, with resultant fatigue, lassitude or irritability, headache, gastro-intestinal disturbances, palpitation, precordial pain, dizziness, numbness of the extremities and dyspnœa on exertion. A gradual rise of diastolic blood pressure with a consequent lowering of pulse pressure is produced. The author suggests that solutions containing toxic solvents should be labelled to indicate the solvent and how to avoid its toxic effects. Doctors should consider the possibility of toxic solvents as a cause of any illness in a patient with the symptoms outlined.

Maximum Allowable Concentrations of Atmospheric Impurities.

PHILIP DRINKER AND W. A. COOK (*The Journal of Industrial Hygiene and Toxicology*, January, 1949) refer to the difficulties involved in the laying down of safe atmospheric concentrations for toxic substances. They state that atmospheric impurities can be tolerated safely at concentrations which vary with the toxicity of the compound, the duration of exposure and the reaction produced. Only a few substances, like carbon monoxide, have such well-defined systemic effects that safe exposures can be defined with a high degree of precision. Most others, like benzol and carbon tetrachloride, fit best into zones of toxicity. Six such zones are set out for a number of representative substances, ranging from the least harmful, like acetone, at concentrations ranging from 500 to 2500 parts per million, to the extremely toxic, like radon gas, at concentrations below 0·1 part per million. It is believed that this classification of contaminants should be of practical value in the understanding and control of industrial health hazards.

Vesical Tumours from Chemical Compounds.

M. W. GOLDBLATT (*British Journal of Industrial Medicine*, April, 1949) discusses the incidence of vesical tumours occurring among workers in that part of the chemical industry which deals with organic intermediates, especially aromatic amines. After discussing the incidence in similar factories in Europe, he gives an analysis of the cases of vesical tumours in two English factories manufacturing a variety of organic intermediates and dyestuffs. In 100 cases the mean period from the patient's entry into the industry till the first discovery of the tumour was 18·95 years. In 93 cases the mean age at first recognition of the tumour was 50·55 years. In 60 cases the mean age at death from the tumour was 54·2 years. The analysis indicates that the earlier the industry is entered, the earlier is death likely to occur if a tumour is contracted. Comparison with the Registrar-General's returns of deaths due to tumours of the urinary tract shows that the proportion of deaths at ages less than forty-five years due to occupational tumours of the bladder far exceeds that for urinary tumours in the general population. Although of the primary aromatic amines only β-naphthylamine has been shown experimentally to produce bladder tumours in dogs, evidence is presented that cases arise not only among workers who have been engaged exclusively in work connected with β-naphthylamine, but also among others engaged exclusively in work connected with aniline, benzidine and α-naphthylamine (containing a small percentage of the β-isomer). The present series of cases suggests that bladder tumours arising in workers who have been in contact with β-naphthylamine or with more than one of the amines mentioned are more likely to be malignant from the start than those arising in workers in contact with one only of these amines. Figures are given showing the survival times after operation so far recorded in the present series. Recurrences (freshly sprouted tumours in the main) are a feature of the disease and may appear from as little as a month or two after operation to as long as seven years after. Recurrences may appear long after the patient has left the industry. Cases are recorded among workers who have been exposed in occupations ancillary to manufacture and use of the carcinogenic amines. Metastases are relatively uncommon. Tumours of the excretory passages other than those of the bladder are very rare. Brief indications are given of possible improvements in forms of procedure which could contribute to elimination of the disease and which have proved valuable in practice. The view is held that the so-called amino carcinogens are only indirectly responsible for the tumour formation, in that they sensitize or potentiate the tissue to the true carcinogen, and also that the amino potentiator (carcinogen, as it is now called) is carried in the urine.

Public Health Problems in Nuclear Fission.

A. E. GORMAN AND A. WOLMAN (*American Journal of Public Health and The Nation's Health*, April, 1949) discuss from the point of view of the public health engineer and the industrial hygienist problems associated with the atomic energy industry and suggest that the solutions are along the lines of well-established principles. Nuclear fission operations start with the refining of raw materials, mainly uranium ores. This involves hazards from plain and radioactive dusts and fumes. During and after production, operators must be shielded by thick lead and concrete walls from the radiations of the radioactive materials resulting from the neutron bombardment of uranium in the atomic "pile". Waste products consist of large quantities of radioactive cooling water and radioactive materials, which may be dry, liquid or gaseous. Similar hazards and problems are associated with the use of radioactive material in research laboratories and with work with radioisotopes. As many radioactive substances have short half-lives the primary treatment of the cooling water is retention and storage until the radioactive substances it contains cease to emit energy, but substances with long half-lives have to be removed, usually by coagulation, sedimentation and filtration, before the water can be released. Dry wastes, when of low radioactivity, are buried; when of high radioactivity, they are placed in a shielded container and buried when it is safe to do so. Liquid wastes are disposed of by "cribbing" and "lagooning". Gaseous wastes are removed from the stack and hood effluents by filtration. The authors suggest that as the industry grows there will be an increasing need for assistance from sanitary engineers and public health workers who have had training in the fundamentals of nuclear physics.

British Medical Association News.

MEETING OF THE FEDERAL COUNCIL.

A MEETING of the Federal Council of the British Medical Association in Australia was held at British Medical Association House, 135 Macquarie Street, Sydney, on July 22, 23, 24 and 25, 1949, DR. VICTOR HURLEY, C.B., C.M.G., the President, in the chair.

Representatives.

The following representatives of the Branches were present:

New South Wales: Dr. A. J. Collins, D.S.O., M.C., Dr. W. F. Simmons, Dr. H. R. R. Grieve, Dr. A. J. Murray, O.B.E.

Queensland: Dr. A. E. Lee, Dr. H. W. Horn.

South Australia: Dr. L. R. Mallen.

Tasmania: Dr. T. Giblin, Dr. J. L. Grove.

Victoria: Dr. Victor Hurley, C.B., C.M.G., Dr. H. C. Colville, Dr. C. Byrne.

Western Australia: Dr. F. W. Carter, Dr. Leigh Cook.

Minutes.

The minutes of the meetings of the Federal Council of March 1, 2, 3 and 4, 1949, which had been circulated amongst members, were taken as read and signed as correct.

Annual Report of the Federal Council.

The annual report of the Federal Council for the year ended June 30, 1949, was received and adopted.

The Retirement of Sir Henry Newland.

The General Secretary read a letter from the South Australian Branch, recommending that consideration should be given to the establishment of a fund to commemorate the outstanding services of Sir Henry Newland to the medical profession in Australia. The suggestions included the establishment of a prize in surgery on similar lines to the Jacksonian Prize of the Royal College of Surgeons of England, and also of a Henry Simpson Newland Oration to be delivered at all future Australasian Medical Congresses, Sir Henry Newland to be asked to deliver the first oration. The South Australian Branch's letter had been sent to the Branches. The New South Wales Branch had agreed that some memorial should be established, but that, having regard to the fact that one evening of the limited number available to members of congress was taken up by a congress lecture, consideration should be given to some form of commemoration other than an oration. The Tasmanian Branch agreed with the suggestion. The Victorian Branch left the matter in the hands of its delegates. The Queensland Branch supported the suggestion, and the Western Australian Branch agreed in principle. Dr. A. E. Lee raised the question of whether memorials such as that proposed should be established in perpetuity, or whether a period of years should not be stated at the outset. Dr. W. F. Simmons thought that the public lecture at congress might be known as the Henry Simpson Newland Oration, and Dr. A. J. Collins spoke in favour of the establishment of a prize. It was resolved that the services of Sir Henry Newland to the medical profession should be commemorated by an oration, to be known as "The Henry Simpson Newland Oration", to be delivered at all future sessions of the Australasian Medical Congress (British Medical Association), and that a fund should be established for a prize in surgery on lines similar to those of the Jacksonian Prize. It was decided that as the orator for the Seventh Session of the Australasian Medical Congress had already been selected, further consideration be deferred until the first meeting of the Federal Council in 1950.

Appointment of an Assistant General Secretary.

At the previous meeting of the Federal Council the representatives of the New South Wales Branch, together with the General Secretary, were constituted a committee to interview applicants for the position of Assistant General Secretary, and they were given executive authority to make an appointment. It was noted that Dr. J. H. Priestley had been appointed to the position, and that he had commenced duty on May 2, 1949. Dr. Priestley was welcomed to the meeting and congratulated on his appointment by the President.

Finance.

The financial statement and balance sheet of the Federal Council as at June 30, 1949, were received and adopted. Dr. W. F. Simmons, the Honorary Treasurer, said that the auditor had suggested that the financial year of the Federal Council should end at December 31 and not at June 30, as at present. He moved accordingly. The recommendation was adopted.

The contributions of the Branches for 1949 were noted, and Dr. W. F. Simmons gave an estimate of the probable expenses up to December 31, 1949. He pointed out that the expenses were likely to be heavy, because in all probability another meeting would be held before the end of the year. It was decided that the contribution of the Branches to the expenses of the Federal Council for 1950 should be at the rate of 21s. for each member on the membership list as at January 1, 1950.

The making of grants to the smaller Branches for organization purposes was considered. A communication was received from the Tasmanian Branch together with a copy of the annual report and financial statement for 1948-1949, requesting financial assistance. It was resolved that a grant of £200 should be made to the Tasmanian Branch for 1948-1949. A request was also received from the Western Australian Branch in regard to medico-political expenses incurred during the year ended December 31, 1948, and it was resolved that a grant of £378 should be made to the Branch in respect of these expenses.

The Federal Independence Fund.

At the previous meeting of the Federal Council it was resolved that a Federal Independence Fund should be launched. Dr. W. F. Simmons, Dr. A. J. Collins, Dr. H. R. R. Grieve, Dr. A. J. Murray and Dr. J. G. Hunter were appointed trustees of the fund. Dr. W. F. Simmons gave an indication of the response so far obtained. A discussion took place on the purposes for which the fund might be used, and it was decided that the trustees of the Federal Independence Fund should have before them a recommendation from the Federal Publicity Committee before approval was given to items of expenditure from the fund for publicity purposes.

The Reservation of a Site for the Federal Council at Canberra.

At previous meetings of the Federal Council reference had been made to correspondence that passed between the Surveyor-General and Chief Property Officer at Canberra and the Federal Council, concerning the reservation of a site for the British Medical Association at Canberra. The matter had been left in the hands of the General Secretary for further inquiries to be made. The General Secretary now reported that he had at length received a reply to two of his previous letters. Sites such as that referred to for the Federal Council were leased in the city for a maximum term of ninety-nine years, and the rental of the lease was determined by the Minister. It was pointed out that a good deal of information had yet to be obtained, and the obtaining of this information was left in the hands of the General Secretary.

The Medical Officers' Relief Fund (Federal).

Dr. W. F. Simmons, on behalf of the trustees of the Medical Officers' Relief Fund (Federal), presented a report for the year ended June 30, 1949. Five loans were still in existence, and it was proposed that one of these should be written off, as the debtor had died. The report was adopted.

The Federal Medical War Relief Fund.

Dr. W. F. Simmons, on behalf of the trustees of the Federal Medical War Relief Fund, presented the balance sheet and trustees' report for the year ended June 30, 1949. He pointed out that the fund now stood at more than £20,000. Benefactions by way of gifts had absorbed the sum of £767 during the year; so far twelve claims for assistance had been made on the fund, eleven by way of gifts and one by way of a loan. The report was adopted.

Discussion took place on the suggested enlargement of the scope of the fund to provide endowment policies for children of deceased medical officers, and it was thought that it might be possible to do this in certain cases. Dr. Simmons also said that correspondence had taken place between the President of the Federal Council and the Branches on the suggestion of the former that the closing date of the fund might be extended. All the Branches had agreed to this, and on the motion of Dr. A. J. Murray it

was decided that the fund should remain open, and that an annual statement of account together with an appeal for further donations should be issued before June each year.

Inquiries about Medical Practice in Australia.

The General Secretary reported that he had received inquiries from several practitioners overseas regarding the opportunities of practice in Australia available to them. He explained that replies of the usual type had been sent. He said that the Tasmanian Branch had asked for advice regarding the type of reply that should be sent to overseas inquirers. The suggestion was made by the Victorian Branch that a standing advertisement should be inserted in the *British Medical Journal*, advising members of the profession who were contemplating coming to Australia to communicate first with the Secretary of the relevant State Branch of the British Medical Association. It was resolved that this should not be done.

Congress of the International Society of Surgery.

A letter was received from the Director-General of Health, advising that the thirteenth congress of the International Society of Surgery would be held at New Orleans, United States of America, from October 10 to 15, 1949.

The Tuberculosis Act of Tasmania.

The General Secretary reported that he had received from the Tasmanian Branch copies of the *Tuberculosis Act* of the State of Tasmania. It was noted that the Tasmanian Upper House had consulted the Tasmanian Branch before the passage of the measure. It was resolved that a copy of the comments of the Tasmanian Branch Council should be forwarded to the Branches.

South African Medical Congress.

A letter was received from the Medical Association of South Africa, announcing that the thirty-seventh medical congress (the sixteenth annual scientific meeting) would be held at the University of Cape Town from September 19 to 24, 1949. Dr. F. W. F. Purcell, the Honorary Organizing Secretary, sent a copy of the provisional programme.

The Retirement of Dr. Guy Dain.

It was resolved that a valedictory letter should be sent to Dr. Guy Dain on the occasion of his retirement from the position of Chairman of the Central Council of the British Medical Association.

Australasian Medical Congress (British Medical Association).

Sixth Session.

A financial statement was received from the Honorary Treasurer of the Sixth Session of the Australasian Medical Congress (British Medical Association) held at Perth from August 15 to 21, 1948. The statement was received.

Seventh Session.

The General Secretary reported that he had received a communication from the Honorary Secretary of the Seventh Session of the Australasian Medical Congress (British Medical Association), to be held at Brisbane from May 27 to June 3, 1950, stating that His Excellency Lieutenant-General Sir John Lavarack, K.B.E., C.B., C.M.G., D.S.O., Governor of Queensland, had accepted the invitation of the executive to be patron of the congress.

The General Secretary reported that the following nominations for the position of vice-president of congress had been received from the several Branches: Queensland, Dr. H. Love; New South Wales, Dr. A. J. Collins; Victoria, Dr. Robert Southby; South Australia, Dr. E. Britten Jones; Western Australia, the President for 1950; Tasmania, Dr. W. K. McIntyre.

It was resolved that a formal invitation should be sent to the Parent Body to send a representative to the Seventh Session.

The General Secretary said that the President had given approval for the subscription rate to the Seventh Session to be three guineas *plus* local contributions for the entertainment fund. The action of the President was confirmed. It was also resolved that the incidental expenses of the honorary local secretaries in the several States should be borne by the respective Branches.

On the nomination of the Executive Committee, the following were appointed honorary members of the Seventh Session: His Grace Archbishop Halse, His Grace Archbishop Duhig, the President of the Council of Churches for 1950, the Federal Minister for Health, the Premier of Queensland, the Minister for Health and Home Affairs, Queensland, the Lord Mayor of Brisbane, the Speaker of the Legislative Assembly of Queensland, the Chief Justice of Queensland, the Chancellor and Vice-Chancellor of the University of Queensland, the Dean of the Faculty of Medicine of the University of Queensland, the President of the Professorial Board of the University of Queensland for 1950, the Leader of the Opposition of the Legislative Assembly, Queensland, Sir John Medley, Mrs. Myra Spooner, Dr. Mervyn Archdall, Dr. Diamond, of Boston, United States of America, Dr. Haymaker, of the Armed Forces Institute of Pathology and Neuropathology.

British Commonwealth Medical Conference.

First Annual Meeting.

The Federal Council received a report from Dr. John Hunter, who attended the first annual meeting of the British Commonwealth Medical Conference at Saskatoon, Canada, as its representative, on June 7 to 9, 1949. An account of this meeting was published in THE MEDICAL JOURNAL OF AUSTRALIA of July 2, 1949. In adopting the report of the General Secretary, the Federal Council placed on record its appreciation of the services rendered by Dr. John Hunter as its representative.

Second Annual Meeting.

The General Secretary announced that the British Commonwealth Medical Conference had resolved that the second annual meeting was to be held in Brisbane prior to the Australasian Medical Congress (British Medical Association) at the end of May, 1950. He explained that it was customary for the president to be elected by the Dominion acting as host. It was therefore resolved that Dr. Victor Hurley should be nominated as president of the second annual meeting of the British Commonwealth Medical Conference. Dr. A. E. Lee and Dr. H. R. R. Grieve were appointed delegates to the conference, and the appointment of observers was left in the hands of the President. It was explained that Dr. John Hunter would be the secretary of the meeting.

It was further resolved that Dr. H. R. R. Grieve, Dr. A. E. Lee and Dr. H. W. Horn, with the President, should be appointed a committee to make suggestions in regard to papers to be delivered at the second annual meeting of the British Commonwealth Medical Conference.

The Advertisement of Medical Vacancies in the "British Medical Journal".

The General Secretary stated that he had in recent months received some inquiries from the editor of the *British Medical Journal* in regard to the acceptability of advertisements offered for publication in the *British Medical Journal*. He pointed out that this raised the whole question of acceptability of advertisements, and he referred to some of the difficulties experienced by the Editor of THE MEDICAL JOURNAL OF AUSTRALIA. A general discussion took place on the remuneration which should be offered for different kinds of appointment. Attention was also directed to the varying standards of suitability shown in the several States. The General Secretary pointed out that only in regard to one or two matters had the Federal Council expressed an opinion of the rates of remuneration which should be offered to appointees. It was finally resolved that a committee of the Federal Council, together with an adequate number of coopted members, should be appointed to report on desirable salary standards for all classes of full-time medical appointments. It was also resolved that Dr. W. F. Simmons, Dr. H. W. Horn, Dr. L. R. Mallen, Dr. H. Leigh Cook and Dr. J. L. Grove, together with the President, should be members of the committee.

Subscription Rate to the "British Medical Journal" for Medical Students.

The General Secretary reported that he had received a communication from the editor of the *British Medical Journal*, stating his desire to extend to medical students in Australia the opportunity of subscribing to the *British Medical Journal* at a reduced subscription rate of 10s. 6d. *per annum*. He said that a notice to this effect had already been published in THE MEDICAL JOURNAL OF AUSTRALIA.

Organization of the Medical Profession.

The General Secretary reported that he had visited the Queensland Branch on March 22, 1949, to address the Branch on matters connected with the organization of the medical

profession, and he also reported to the Federal Council the result of his visit to the United States of America and to Canada during May and June, 1949.

Special Groups.

The General Secretary reported that he had received from the Dermatological Association of Australia (British Medical Association) a draft copy of the rules for the approval of the Federal Council. The rules were formally approved.

The Oto-Rhino-Laryngological Society of Australia (British Medical Association) submitted a draft constitution for the approval of the Federal Council. Approval of the constitution was given.

Further reference was made to the proposed constitution of the Australian Society of Anæsthetists, which was a special group of the British Medical Association in Australia. This matter was discussed at the previous meeting of the Federal Council, when it was pointed out that according to the new constitution the Federal group overrode the State sections, and it was agreed by the Federal Council that this kind of thing had never been intended. The General Secretary now reported that he had received a copy of the new constitution of the society, which asked the Federal Council to give its approval. It was pointed out that the defect mentioned at the previous meeting was still present, and the matter was left in the hands of the General Secretary. It was also resolved that the President should be authorized to approve the constitution of the society if a satisfactory amendment was made.

A communication was received from Dr. Robert Southby, of Melbourne, submitting an application for the creation of a special group to be known as the Australian Pædiatric Association. Approval was given.

The National Health and Medical Research Council.

The Federal Council had before it the report of Dr. W. F. Simmons, the Federal Council's representative on the National Health and Medical Research Council, of the twenty-seventh session of the council, held at Sydney on May 24, 1949. In the course of his report Dr. Simmons stated that a request had been received from Saint Vincent's Hospital, Melbourne, for a grant of £50,000 to establish a suitable building to house a medical research unit and an annual grant of £5000 towards the expense of maintaining the unit. The Medical Research Advisory Committee of the National Health and Medical Research Council had considered this application, and the following recommendation was made in respect of clinical research generally:

> In view of the definite instructions from the Treasury, it is improbable that in the future this Council will be able to support new clinical research units on the same financial scale as that which has hitherto been given for the establishment and maintenance of clinical research units at the Royal Melbourne Hospital and the Royal Prince Alfred Hospital, Sydney.

The committee considered that active clinical research should be carried out in the main teaching hospitals, but any such grant for this purpose should be administered with the advice of special advisory bodies. In view of the state of the finances of the council, it was regretted that no financial assistance could be given.

The Medical Research Advisory Committee also recommended to the full council that the chairman of the committee (Professor H. R. Dew) and Dr. A. J. Metcalfe should make a further approach to the Minister for Health for permission to approach the Treasury for additional funds for research, in view of the fact that legitimate requests for aid could not be met. It was thought that this approach to the Treasury might be made after the November meeting of the council, when there would probably be sufficient evidence to show that worthy applications were being refused owing to lack of funds. The full council later endorsed this recommendation.

The Federal Council discussed Dr. Simmons's report, and resolved to approach the Federal Government with the request that the research grant should be increased from £60,000 to a minimum of £120,000 for 1950.

Publicity.

The General Secretary reported that Dr. H. C. Colville had tendered his resignation as a member of the Publicity Committee, and added that after correspondence with the President Dr. Charles Byrne had been appointed to fill the casual vacancy. The President's action was approved.

The Publicity Committee was reappointed, with the following membership: Dr. W. F. Simmons, Dr. A. J. Collins, Dr. H. R. R. Grieve and Dr. Charles Byrne.

A general discussion on the question of publicity took place, and during the course of the discussion statements and letters from several of the Branches were read. It was made clear that the control of publicity in all its aspects from one central committee was extremely difficult and not particularly satisfactory. Several members of the Council claimed that factors peculiar to different parts of Australia had to be taken into consideration by State Branches, and it was a fact that in one State relations with the daily Press might be happier than in another. Some newspapers would accept a type of communication which would not be acceptable to papers in another State. The time factor sometimes caused difficulty, especially with a Branch so widely separated from other Branches as the Western Australian Branch was. The Federal Council resolved that in future the greater part of publicity should be undertaken by the Branch Publicity Committees, and it was also resolved that the functions of the Federal Publicity Committee should in general be such as fell under the three following headings: in the first place, to undertake publicity which could not adequately and conveniently be undertaken by the Branch Publicity Committees owing to its general nature; secondly, to receive periodical reports on Branch publicity from the Branch Publicity Committees and to send copies of these reports to other Branches; thirdly, to advise the trustees of the Federal Independence Fund regarding subventions to the Publicity Committees of any Branches requiring financial assistance.

The Federal Council determined that, apart from subventions to Branches requiring assistance, the cost of publicity undertaken by the Branches should be borne by the Branches.

The Pharmaceutical Benefits Act, 1947-1949.

A discussion took place in regard to the *Pharmaceutical Benefits Act*, 1947-1949, which was to be proclaimed on July 25, 1949. Reference was also made to the writ which the Federal Council intended to issue out of the High Court of Australia on the day on which the Act was proclaimed.

National Health Service.

Administration of a National Health Service.

At the previous meeting of the Federal Council a scheme of administration of a national health service was received from the Western Australian Branch, and it was decided that it should be sent to the other Branches for their consideration. The General Secretary said that this had been done. The New South Wales Branch had not approved of the scheme. The Tasmanian Branch had given its general approval to the scheme, but thought that it should be considered at a later date. The Victorian Branch thought that consideration of the scheme should be deferred until agreement with the Government had been reached. The South Australian Branch thought that the present time was inappropriate for consideration of the scheme. The General Secretary pointed out that the document was informative, and that it might be of use at a later date. On the motion of Dr. H. Leigh Cook consideration was deferred.

Positive Proposals for a National Health Service.

The Federal Council had before it three documents dealing with positive proposals for a health policy. The first of these came from the Queensland Branch, and contained suggestions for improvement in methods of conducting private practice. The second document came from Dr. Charles Byrne, and the third from the New South Wales Branch. The Queensland document was discussed at some length, and it was decided that in regard to the provision of a twenty-four hour service in private practice, the Federal Council should recommend to Branch Councils that all members in private practice should be informed that it was their duty to provide a twenty-four hour service. This could be assured by the cooperation of doctors in a district by several means. These included the employment of assistants, partnership or group practice, the establishment of a roster of doctors who would be available outside the usual hours of practice, and the use of a central telephone address where patients could be referred to a doctor for emergency services.

The geographical distribution of practitioners was discussed, and the Federal Council recommended to the Branch Councils that arrangements should be made for the best possible distribution of private practitioners throughout the States. Since this was possible only on a voluntary basis, it was recommended that a plan should be prepared showing the desirable disposition of general practitioners and specialists in the respective States. The available openings could then be made known, and doctors with the

requisite qualifications invited to settle in areas where such openings were available.

The Federal Council further recommended that Branches should make every effort to provide and to develop voluntary prepayment methods of finance for persons in the middle income group. In particular the systems of hospital and medical benefits sponsored by the New South Wales Branch should be encouraged in the immediate future. The Federal Council also expressed the opinion that lodge practice within the present income limits should be encouraged, and it recommended the Branch Councils to explore the possibility of providing a more complete service, including ancillary and specialist services under such auspices.

In regard to the treatment of the indigent, the Federal Council expressed the opinion that an approach should be made by the Branch Councils to their respective State Governments, reminding them of their responsibilities for the care of this group of the community, and advocating the placing of such persons on lodge lists with the payment of their dues by government agencies.

Since adequate hospital beds were essential to the continuance of private practice, the Federal Council was of the opinion that every effort should be made to provide hospital beds under private, church or government auspices.

The statements of policy submitted by the New South Wales Branch and Dr. Charles Byrne were approved in principle, and it was resolved that they should be welded into one comprehensive statement, and this was done. It was decided that this statement of policy should be printed and made available for the information of the public at the earliest possible opportunity.

The Federal Council had before it a statement prepared by the Medical Benefits Fund of New South Wales. This had been sent by the New South Wales Branch, and the Federal Council resolved that the statement should be sent to the other Branches with a recommendation that they should take steps to bring into operation schemes of a similar type, either on their own account, or in cooperation with the Medical Benefits Fund of New South Wales.

World Medical Association.

The General Secretary reported that several documents had been received from the World Medical Association. One of these had to do with post-graduate medical education and specialist training. It was an addendum to a *questionnaire* previously issued on the subject. The General Secretary said that he had obtained the necessary information from the Branches, and had completed the *questionnaire* and sent the information to the Secretary-General of the World Medical Association.

The General Secretary reported that he had received a preliminary draft report on social security and the medical profession; this had been drafted by the Committee on Social Security of the World Medical Association. The General Secretary said that the first *Bulletin* of the World Medical Association had also been received.

A communication had been received from the World Medical Association in regard to habit-forming drugs. It was stated that the association had been asked by the World Health Organization to cooperate with it in the investigation of habit-forming drugs. The invitation had been accepted by the Council of the World Medical Association, and the Secretary-General sought information from two points of view. The World Health Organization was interested in securing information on the use and the dispensability of diacetyl morphine (heroin) and an estimate of the amount used in each country. The World Health Organization was also interested in establishing a mechanism for giving a single name to every habit-forming drug subject to international control. The Federal Council resolved to obtain the information from the Branches in connexion with the first of these two objectives, and resolved to forward it to the World Medical Association. It also approved of the establishment of the mechanism for giving a single name to every habit-forming drug.

A suggestion was received from the World Medical Association that the position of member national medical associations in government contacts might be strengthened if the Government of each country was informed that the national medical association in the country expressed not only its own opinions, but also the opinions of the World Medical Association. After discussion the Federal Council resolved to inform the World Medical Association that it had considered the suggestion and would communicate with the World Medical Association should it need its help on any specific matter.

Consideration was given to the Declaration of Geneva (see THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, 1948, page 611). It was pointed out that the wording was defective. It was resolved that the World Medical Association should be informed that the Federal Council was not in agreement with the declaration as set out in the preliminary report on medical ethics, and that its comments in regard thereto would be sent at a later date.

It was noted that Dr. John Hunter had been appointed Assistant Secretary of the South-West Pacific Area, and this appointment was approved. In regard to the third annual meeting of the association, to be held in London from October 11 to 15, 1949, the Federal Council resolved that Dr. L. L. Davey, of South Australia, should be appointed a delegate to attend the meeting, and that Dr. H. K. Pawsey, of Western Australia, should be appointed an observer. The further appointment of a delegate and observers was left in the hands of the General Secretary.

Approval was given to the action of the Honorary Treasurer of the Federal Council in paying the 1949 annual subscription to the World Medical Association—1308.80 Swiss francs (£95 1s. 5d. Australian currency).

Contract Practice.

Contract Practice Committee.

At the previous meeting of the Federal Council a suggestion was made that a Contract Practice Committee should be appointed, composed of members of the Federal Council, which should, immediately prior to meetings of the Council, consider and make recommendations in regard to matters on the agenda relating to contract practice. It was thought that this committee might deal with matters referred to it by the Council. The General Secretary said that this proposal had been referred to the Branches for their consideration. Several Branches had expressed their approval of the idea, but Victoria and New South Wales were both opposed to it. A discussion took place on a motion for the implementation of the proposal. During the discussion reference was made to a letter from the Western Australian Branch, in which the advantages of the proposal were set out under several headings. The Western Australian Branch thought that the Federal Council's time would be saved if, when it was considering contract practice matters, it had before it a recommendation from a committee. Branch Councils had been using the committee for some time with great advantage. It was also thought that once a committee was established, matters might be partly thrashed out by correspondence beforehand, and that this would ensure some continuity of procedure. Again, it was suggested that a committee might help to allay dissatisfaction arising in some quarters from the fact that a general practitioner committee had been appointed by the Federal Council. It was also thought that the committee would be able to coordinate State movements—for example, those to do with a workers' compensation schedule and the question of certain fees payable by the Repatriation Department. In the discussion it was pointed out that there was a great difference between committee work on Branch affairs and committee work on Federal Council matters, which concerned all the Branches. The motion was lost.

Tasmanian Common Form of Agreement.

A request was received from the Tasmanian Branch for approval of a proposed alteration in one of the clauses of the Common Form of Agreement. This alteration had to do with the laying down of an income limit for Tasmania. Approval was given.

The Medical Examination for Pilots' Licences for Aircraft.

At the previous meeting of the Federal Council reference was made to the fees payable for the medical examination for pilots' licences for aircraft, and the Council resolved that the fee should be two guineas for the initial examination and one and a half guineas for reexamination. The General Secretary said that he had recommended this decision to the Director-General of Civil Aviation and had received a reply stating that his department had dissociated itself from any statement in regard to fees, and had informed authorized examiners that the fee payable for a medical examination in connexion with an application for an aircrew licence should be that which was locally regarded as a reasonable amount for such examination. The members of the medical profession were therefore quite free to follow the Federal Council's determination if they wished. The letter was noted.

A communication was received from the Victorian Branch in regard to correspondence that had taken place with the local officers of the Australian Air Pilots' Association. The

correspondence had reference to the medical examination record sheet, in which the examinee was required to state what illnesses he had had and what time he had lost from work on account of any illnesses. The pilot was then required to sign a declaration stating that the information given by him was true in every particular, and agreeing that a medical practitioner, hospital or other medical organization would be free to reveal any information which might assist in assessing whether the pilot met or continued to meet the prescribed medical standard. The pilot declared that he waived all professional confidence and the provision of law as to privilege or otherwise forbidding such disclosure. The Federal Council deferred consideration pending receipt by the Victorian Branch of a reply to its inquiry from the Australian Air Pilots' Association whether the signing by a pilot of the declaration on the record sheet would be a valid consent to the disclosure of information relative to health questions, both during the lifetime of the pilot and after his death.

Fee for Examination of Candidates for Life Assurance.

At the previous meeting of the Federal Council discussion took place in regard to the fees for life assurance examinations, and the Federal Council resolved that the fee payable for use of the extended form should be two guineas. It was also decided to communicate this decision to the Life Offices Association of Australia. The General Secretary reported that a conference had taken place between the Life Offices Association of Australia and representatives of the Federal Council. Mr. M. C. Buttfield had asked that the Federal Council's consideration should be given to the matter. He regretted the delay that had taken place, but it had been occasioned in part by the fact that negotiations were taking place with the medical profession in New Zealand, with whose members an agreement had been come to that the fee should be £1 7s. 6d. In Great Britain agreement had been reached that a fee of £1 11s. 6d. should be charged, and the same fee was fixed for South Africa. Mr. Buttfield said that he and his colleagues would be prepared to recommend that agreement should be reached with the Federal Council that the fee should be £1 11s. 6d. After discussion it was resolved that the Life Offices Association's offer of a fee of £1 11s. 6d. should be accepted.

The Unemployment and Sickness Benefits Act, 1944.

At the previous meeting of the Federal Council consideration was given to the *Unemployment and Sickness Benefits Act*, 1944, and exception was taken to the request by the Department of Social Services for disclosure of information about patients when the consent of the person concerned had not previously been obtained. On that occasion the Federal Council reaffirmed its previous decision that no information should be furnished without the patient's written consent. It also resolved that when the information required by the Department of Social Services was simply the date on which incapacity commenced, no fee should be charged. When, however, a report was required by the department, the Council reaffirmed its policy that a fee of 10s. should be paid. The General Secretary reported that he had communicated this information to the Director-General of Social Services and had received a reply. In his reply the Director-General had stated that the department tried as far as possible to work on information and medical certificates supplied by claimants for benefit. An approach by the department to a medical practitioner was made only when it was necessary to confirm some information or to assist a claimant in establishing his qualification. Further consideration had been given to the Federal Council's request that a fee of 10s. should be paid by the department when a medical practitioner was asked to give certain types of information. It had been decided that when the department sought information from a medical practitioner that could not reasonably be considered to be available after his previous examinations and consideration of the claimant's case, a fee of 10s. as requested would be paid. In other words, the fee would be paid when the practitioner was asked to apply himself to some new aspect which, in the ordinary run of things, would not otherwise have been considered. The Director-General drew attention to the difficulty of defining the distinction which it was proposed should be drawn. He therefore suggested that the Assistant Director of the department should call on the General Secretary so that some appropriate wording could be decided upon. An interview had taken place between an administrative officer of the department and the Assistant General Secretary. At this interview the Federal Council's point of view was clearly stated, and it was suggested that the department should look to the patient to supply all information, even if such a course meant slightly greater delay in the settling of claims. In regard to payment, the department's view was that it expected the patient to pay for the original examination and certificate, and would be prepared to authorize payment of 10s. to doctors only for reports on questions which had not been raised before. It was agreed that this meant that the patient was receiving at least 10s. less benefit, but the Treasury would not agree to further payment. It was noted that the *Unemployment, Sickness and Benefits Act*, 1944, had been repealed by the *Social Services Consolidation Act*, 1948.

Salaries of Government Medical Officers Employed on a Full-Time Basis.

At its previous meeting the Federal Council discussed the salaries of government medical officers employed full time, and decided that a base rate should be determined by the Federal Council for such officers. It also decided that the Federal Council should appoint a committee to prepare a log of salaries and conditions of service of government medical officers for submission to the Branches for their consideration. The President with Dr. H. C. Colville and Dr. Charles Byrne were appointed members of the committee. It was decided to defer action in this matter until the report of the subcommittee appointed earlier in the meeting had been received.

Reference was also made to the fact that the Repatriation Medical Officers' Association had filed claims with the Public Service Arbitrator covering the salaries paid to its officers together with the question of furlough. In a letter to the Branches the General Secretary had stated on the instruction of the President that there was no question about agreement by the Federal Council on moral and practical support of the Repatriation Medical Officers' Association claim. A good deal of information was required by the repatriation medical officers, and the Federal Council resolved that Branch councils should be requested to make available to the Repatriation Medical Officers' Association, if required, any information which they might be able to obtain regarding the incomes of general practitioners and specialists. The claim of the repatriation medical officers would involve them in considerable expense, and at the request of the Federal Council several Branch councils had agreed to make a contribution towards these expenses on a *pro rata* basis.

Repatriation Department.

Medical Benefits for Widows, Widowed Mothers and Orphans of the 1914-1918 War.

At the last meeting of the Federal Council a letter was received from the Chairman of the Repatriation Commission, asking whether widows and dependants of the 1914-1918 war could be put on the same basis as those of the 1939-1945 war in regard to medical benefits. The request was referred to the Branches and all were in favour of the proposal. The General Secretary reported that he had communicated this decision to the Chairman of the Repatriation Commission, and had received a reply from him expressing his appreciation of the cooperation of the Federal Council.

Fees Payable to Local Medical Officers.

The General Secretary reported that he had been unable to obtain a reply from the Minister in regard to the payment of fees to local medical officers. It was resolved that a further letter should be sent.

In regard to the fee payable for reports on ex-service personnel, the General Secretary reported that a letter had been received from the Chairman of the Repatriation Commission to the effect that the present fee of 10s. paid to medical practitioners for a copy of clinical notes would not be increased.

London House.

The General Secretary reported that he had received a communication from London House, stating that Brigadier E. C. Pepper, C.B.E., D.S.O., had been compelled to postpone his proposed visit to Australia until next year.

The Examination of Applicants for the Invalid Pension.

At its previous meeting the Federal Council at the instance of the Victorian Branch considered the fees payable to local Commonwealth medical officers for the examination of applicants for invalid pensions. The Federal Council resolved that these fees should be increased. It determined that the fees paid for examination of applicants and the supplying of reports should be one guinea if the examination was made in the surgery and £1 5s. *plus* mileage one way

beyond two miles if the examination was made away from the surgery. The General Secretary reported that this determination had been sent to the Branches and replies had been received. The only question to be decided was that of mileage, and the Federal Council resolved that the mileage fee should be 5s. per mile one way for a distance beyond two miles.

Visit to Australia of Sir Arthur S. MacNalty.

The General Secretary reported that he had received a letter from the Director-General of Health advising that Sir Arthur S. MacNalty, formerly Chief Medical Officer of the British Ministry of Health, and now editor-in-chief of the British official medical history of the war, had been compelled to postpone his visit to Australia. Sir Arthur MacNalty had offered to address members of the several Branches. The General Secretary said that the Branches had been informed of the postponement.

Supplies of Streptomycin.

The General Secretary read a letter which had been received by the Tasmanian Branch from the medical superintendent of the Royal Hobart Hospital. In this letter it was stated that streptomycin had been in extremely short supply, and that some patients who should have been treated with the drug had been deprived of it. The medical superintendent stated that he understood that the periodical shortage of streptomycin was due to the fact that it was impossible to obtain a licence from the Department of Import Procurement for increased supplies from America. He understood that in spite of the fall in price of streptomycin from 30s. to 9s. per gramme, there had been no increase in the quantity of the drug allowed to be imported from America. He also understood that the quantity to be imported from America was assessed by the Department of Import Procurement, which had no medical representative. The letter was referred to the Branches, and replies had been received agreeing in general that supplies were imported at intervals of three months, the amount being restricted by the availability of dollars. It appeared that towards the latter portion of each interval some difficulty was experienced in obtaining adequate supplies. The letter had also been referred to the Director-General of Health, who advised that the Department of Trade and Customs, in the twelve months ended December 31, 1948, had issued licences for the importation of 118,595 grammes of the antibiotic. He also indicated that licences to import 33,950 grammes had been issued in the quarter ended March 31, 1949, and for 46,000 grammes in the quarter ended June 30, 1949. In the quarter ending September 30, 1949, between 55,000 and 60,000 grammes would be available.

Exempt and Temporary Employees of the Commonwealth Public Service.

A letter was received from the New South Wales Branch, asking for information about the present position covering the fee for medical examination of exempt and temporary employees of the Commonwealth Public Service at the time of employment. Consideration was deferred until further information had been received.

Workers' Compensation Act.

A letter was received from the Western Australian Branch suggesting that unanimous and Australia-wide action be taken by the medical profession with a view to the payment of adequate fees for all medical work under the *Workers' Compensation Act*. The Federal Council agreed that this should be done, and determined that a copy of the schedule of fees drawn up in respect of the treatment of injured workers entitled to the benefits of the Commonwealth compensation act should be forwarded to the Branches for their comment, and that from the information furnished a model schedule of fees should be drafted and a copy sent to the Branches, in order that the matter might be considered further at the next meeting of the Federal Council.

The Conditions of Appointment of Medical Officers to the Commonwealth Department of Immigration.

A letter was received from one of the Branch councils, criticizing adversely the salary and conditions of employment of medical officers appointed by the Commonwealth Department of Immigration. According to this medical officer he had charge of nearly 4000 persons, his salary was inadequate and the accommodation provided for him was unsuitable. It was resolved that inquiries should be made from the Branches in regard to the conditions of service and rates of payment of medical officers in Commonwealth immigration reception and training centres in their States.

The French Welcome Organization for World Medical Corps.

The General Secretary read a letter from Dr. P. Cibrie, the secretary of the *Fédération des Syndicats médicaux français*. The organization had been founded in order to welcome and help French and foreign doctors. A welcome centre and a travelling service had been set up, and the address of the association was 60, boulevard de Latour-Maubourg, Paris, VII^{e}.

The Australian Post-Graduate Federation in Medicine.

A request was received from the Australian Post-Graduate Federation in Medicine for information for inclusion in time-tables of the activities and meetings of colleges, medical associations and societies throughout Australia, including details of visits by overseas lecturers. The General Secretary said that the request had been sent to the Branches.

Votes of Thanks.

A vote of thanks was extended to the President, Dr. Victor Hurley, for presiding at the meeting.

The Federal Council also recorded its thanks to the members of the secretariat for their services during the meeting. The Federal Council thanked the New South Wales Branch Council for its hospitality and for the use of its offices, and Dr. A. J. Collins, Dr. W. F. Simmons, Dr. H. R. R. Grieve and Dr. A. J. Murray for their hospitality.

Date and Place of the Next Meeting.

The date and place of the next meeting were left in the hands of the President.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held in the Anatomy Lecture Theatre, Frome Road, Adelaide, on July 1, 1949.

The Respiratory Mechanisms of Erythrocytes.

MR. P. M. NOSSAL read a paper entitled "The Respiratory Mechanisms of Erythrocytes", in which he first of all described the significance of an enzyme system, hæmoglobin reductase, in the maintenance of blood pigment in the active (oxyhæmoglobin) state. He went on to say that the respiration of erythrocytes had been studied in four different systems: intact cells on glucose or lactate, and hæmolysed cells on hexose monophosphate and diphosphate. A series of about twenty inhibitors had been tested against all those systems. It had then been made possible to determine the site of action of those found to be active. Again, the intimate connexion between glycolysis and oxidation of glucose was shown. An attempt had been made to draw up a balance sheet between glucose utilized, lactate and pyruvate formed, oxygen consumed, and carbon dioxide formed. The purpose of the investigation was to determine the fate of glucose during the oxidation, in other words, the number of moles of oxygen consumed and of carbon dioxide produced per mole of glucose oxidized. The investigation had been so far unsuccessful, because the methods used for the estimation of glucose failed to give an accurate measure of hexose phosphate in the cells, thus introducing a comparatively large unknown quantity. It was hoped that by estimating not only the total reducing sugar, but also the free glucose, the difficulty could be overcome.

The Control of Weeds by Chemical Methods.

MR. A. J. K. WALKER read a paper entitled "Some Recent Advances in the Control of Weeds by Chemical Methods". He said that in view of the enormous losses resulting from weed infestation, the recent application of certain growth-regulating substances as herbicides was of major economic importance. The most effective of the substances were 2,4-dichlorophenoxyacetic acid, 4-methyl 2-chlorophenoxyacetic acid, their salts and their esters, which, within certain limits, were at least partially selective for dicotyledonous plants. The herbicides mentioned were more satisfactory than contact poisons because of their selectivity, effectiveness at low concentrations and delayed killing—the latter permitting more extensive translocation throughout the plant. They

caused the cessation of terminal growth and of flower and seed development, and bending of the stems and inflorescences; rapid cell division was promoted in many stem, root and leaf tissues, but normal tissue differentiation was affected; elongation of the primary root ceased and frequently many short, thick laterals were produced. Death of the plant might not occur until several weeks after spraying. When the substances were used as foliage sprays there were several factors which affected the plant's response. Different compounds varied in their general effectiveness and in addition the compound-plant interaction might be important. A most important factor was the growth stage of treated plants; young, actively growing plants were much more susceptible than more mature ones. The addition of activators to the spray solution frequently had a marked effect. The activators might be wetting agents, emulsifiers, penetrants or toxicants, which either altered the permeability of tissue for the growth substance or exerted a separate toxic effect. Mr. Walker went on to say that there was some evidence to suggest that spraying was most effective at temperatures which were optimal for the growth of the particular species. Absorption of the herbicide from the leaf surface was more rapid at higher temperatures. Failure of the normal growth response had frequently been observed in plants placed in the dark; poor translocation was suggested as the explanation. It seemed probable that the amount and direction of movement of the herbicide within the plant were controlled by the movement of food materials. For soil applications, larger doses were required to produce the same result; that method, therefore, was used mainly against seedlings. Toxic effects might persist in the soil for several months, but under conditions of temperature, soil moisture and organic matter content which favoured microbiological activity, effects disappeared within three to eight weeks. Mr. Walker said that there were many applications of the herbicides in agricultural practice. Certain perennial weeds which were resistant to other chemicals might be eradicated; weed control in orchards and row crops might be obtained more cheaply; weed growth in crops and pastures might be checked with consequent increases in yields of grain or herbage. Where maximum selectivity was required the treatment might be modified accordingly; for example, where the weed species and crop species were approximately equal in susceptibility, weed control was frequently possible, advantage being taken of the variation in susceptibility with stage of growth.

Correspondence.

THIRTEENTH INTERNATIONAL CONGRESS OF SURGERY.

SIR: In your notice of this forthcoming congress (THE MEDICAL JOURNAL OF AUSTRLIA, 1949, I, page 824) no mention is made of the fact that the President is Professor George Grey Turner, formerly of Newcastle-on-Tyne and now of London, and the Vice-President, Sir Gordon Gordon-Taylor, of London. Both are well known to Australians. Only one other International Congress of Surgery has had a President from this country; that was Sir William Macewen, many years ago.

Yours, etc.,
Surgical Unit, LAMBERT ROGERS, British Delegate.
The Royal Infirmary,
Cardiff,
Wales.
August 5, 1949.

B.C.G. VACCINATION AGAINST TUBERCULOSIS.

SIR: In THE MEDICAL JOURNAL OF AUSTRALIA of July 30, 1949, there appeared an article by Dr. E. A. North which summarizes, as has been better done elsewhere, the present status of B.C.G. as a preventive measure against clinical tuberculosis. In the course of this article it is implied that the Commonwealth Serum Laboratories are now pioneering this quarter of a century old vaccine in Australia and also its preservation by cooling and freeze-drying methods.

It must, however, be well known to the author that Miss Nancy Atkinson and her associates, working for the Faculty of Medicine of the University of Adelaide, prepared B.C.G. in South Australia during 1946, 1947 and 1948, and during 1948 carried out freeze-drying experiments. This work and the results of the use of the vaccine on over 500 volunteers have already been published in your journal in addition to later work that has been the subject of papers at recent congresses.

Though it is late in the history of B.C.G. for priorities to be of any real significance, it would, in the circumstances, have been courteous to refer to the first preparation of B.C.G. in Australia and its application as a preventive measure to susceptible medical students and nurses.

Yours, etc.,
Adelaide, ORDE POYNTON, M.D., M.A. (Camb.).
South Australia,
August 10, 1949.

Bibliography.

Cowan, D. R. W. (1948), THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, page 371.
Page, G. Erica (1947), THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, page 491.

Royal Australasian College of Surgeons.

OPEN MEETING.

A MEETING of the Royal Australasian College of Surgeons will be held on Wednesday, September 7, 1949, at 8.15 p.m., at the Repatriation General Hospital, Concord. Dr. E. Hedberg will discuss "Single Vitallium Cup Anthroplasty of the Hip", "Double Vitallium Cup Arthroplasty of the Hip", "Arthrodesis of the Hip" and "Chronic Infective Arthritis of the Hip". Dr. A. Armstrong will discuss "Fracture of the Carpal Navicular Bone", "Dislocation of the Semilunar Bone", "Fracture of the Clavicle", "Stapling of the Shoulder" and "Osteotomy of the Hip with Smith-Petersen Pin and Blount Plate". Dr. F. H. McC. Callow will discuss "Vitallium Cup Arthroplasty of the Hip: Three Cases", "Acromionectomy: Five Cases" and "Radical Cure of Acromio-Clavicular Dislocation Using a Lag Screw". Dr. N. Wyndham will discuss "Hindquarter Amputation". This meeting is open to all members of the medical profession.

Medical Prizes.

THE STAWELL PRIZE.

THE Stawell Prize, a memorial to Sir Richard Stawell, is open for competition. The amount of the prize is £30 (thirty pounds).

The conditions are as follows:

1. The prize shall be awarded to the writer of the essay adjudged to be the best on a subject selected annually.
2. The subject for 1949 is "The Practical Significance of Modern Cardiological Investigations".
3. The dissertation should be based on personal observation and experience of the writer.
4. The competition is open to graduates of any Australian university.
5. The trustees reserve the right to withhold the award.
6. Essays must be delivered to the Medical Secretary, British Medical Association (Victorian Branch), by 4 p.m. on February 28, 1950.
7. Each essay must be typewritten or printed and must not exceed 75,000 words in length.
8. Each essay must be distinguished by a motto and must be accompanied by a sealed envelope, marked by the same motto, containing the name and address of the author.
9. The trustees reserve the right to publish the prize essay.

Post-Graduate Work.

NUFFIELD FOUNDATION DOMINION TRAVELLING FELLOWSHIPS.

THE Trustees of the Nuffield Foundation have announced that they will offer to Australian graduates various travelling fellowships to begin in 1950. Three of these will be in medicine, the others being in the natural sciences (2), the humanities (1) and the social sciences (1).

The purpose of the fellowships is to enable men or women who are Australian graduates of outstanding ability to gain experience and training in the United Kingdom in their

chosen fields, and to make contact there with scholars working in those fields with a view to the Fellows' equipping themselves to take up senior posts in research and teaching in Australia. A Fellow will be expected to resume residence in Australia on the completion of the fellowship.

The awards are available to Australian nationals, normally between the ages of twenty-five and thirty-five years, preferably holding a master's or doctor's degree with a year or more of subsequent teaching or research experience on the staff of a university or comparable institution.

The fellowships will normally be tenable for one year, and will be of the value of between £600 and £800 (sterling) *per annum* (exclusive of travelling expenses), according to individual circumstances.

Applications for 1950 fellowships should be submitted not later than November 1, 1949, to the Secretary, Nuffield Foundation Australian Advisory Committee, c.o. University of Melbourne, Carlton, N.3, Victoria, from whom copies of the application form may be obtained.

Notice.

A MANUAL ON THE INTERNATIONAL EXCHANGE OF PUBLICATIONS.

UNESCO proposes to publish later in the year a "Manual on the International Exchange of Publications". It is intended to publish as an annex to this manual a classified list of institutions, including libraries, universities, scientific institutions, learned societies *et cetera*, throughout the world, which are willing to exchange either their own publications or other publications which they have regularly at their disposal. In the course of its activities Unesco has been able to obtain a considerable amount of information concerning the availability of exchange material, but they feel that the information at their disposal is still far from complete. All institutions which have so far not sent to Unesco details of their exchange material in one form or another are therefore urged immediately to communicate the following information to the Unesco Clearing House for Publications, 19 Avenue Kléber, Paris, 16e:

1. Name and full address of institution.
2. Exact titles of publications offered. (In the case of duplicates offered for exchange purposes actual lists of duplicates are not required, but only a statement that lists of duplicates are available. Institutions possessing a catalogue of their own publications available for exchange are asked only to send a copy of the catalogue or to give a full bibliographical description of the catalogue.)
3. Institutions which wish to exchange their publications only under certain conditions, are asked to state what these conditions are.

Only information which reaches Unesco before October 1, 1949, can be used in the manual, and it is therefore in the interests of all institutions concerned to communicate immediately with the above address.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as legally qualified medical practitioners:

Clarke, Denis Morley, M.B., B.S., 1943 (Univ. Melbourne), Imperial Hotel, King's Cross.

Hield, Mary Allen, M.B., Ch.B. (Victoria Univ., Manch.), 1937, M.R.C.S. (England), L.R.C.P. (London), 1938, D.P.H., 1940, D.R.C.O.G., 1941, 56 Clinton Street, Orange.

Hill, Brian Henry Rowland, M.B., Ch.B., 1944 (Univ. New Zealand), c.o. Bank of New Zealand, George Street, Sydney.

DISEASES NOTIFIABLE IN EACH STATE AND TERRITORY OF AUSTRALIA AND NOTIFICATIONS FOR THE WEEK ENDED AUGUST 6, 1949.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	4(3)	1(1)	..	*	..	..	..	5
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	2(1)	2(2)	..	1	1(1)	..	..	..	6
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	36(32)	..	..	..	..	..	36
Diphtheria	10(2)	4(1)	3	1(1)	2(1)	..	..	..	17
Dysentery(*b*)	*	..	..	..	..	..	..	..	..
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	*	*	*	2(2)	*	*	..	..	2
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	*	*	*	*	*	*	*	..
Influenza	*	*	*	..	*	*	..	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(*c*)	*	(*c*)	(*c*)	(*c*)	(*c*)	1(1)(*c*)	(*c*)	(*c*)	1(*c*)
Measles	*	*	*	118(49)	*	*	..	..	118
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	15(7)	..	2(2)	1(1)	..	..	..	18
Psittacosis	*	..	*	..	*	*	*	*	..
Puerperal Fever	..	..	..	2(2)	..	..	..	..	2
Rubella	*	*	*	*	2(2)	*	..	..	2
Scarlet Fever	27(16)	38(4)	2	7(7)	2(2)	2	..	..	78
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	1	1	*	*	*	*	*	2
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	35(24)	19(10)	6(4)	4(3)	3(3)	6(2)	..	..	73
Typhoid Fever(*e*)	..	..	..	1(1)	..	..	..	..	1
Typhus (Endemic)(*f*)	..	..	2	1(1)	2(1)	..	..	..	5
Undulant Fever	*	*	..	*	*	*	*	*	..
Weil's Disease(*g*)	*	*	1	*	*	*	*	*	1
Whooping Cough	*	*	*	37(1)	*	*	..	..	37
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 36, 1944-1945. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
* Not notifiable.
(*a*) Includes "Mossman" and "Sarina" fevers. (*b*) Includes amœbic and bacillary. (*c*) Statistics inexact with varying practice with regard to relapses in Service cases infected overseas. (*d*) Includes all forms except in New South Wales and Northern Territory, where only pulmonary tuberculosis is notifiable. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Cases reported are all of the mild type known as Brill's disease or endemic typhus (including scrub and urban types). (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

Kelsall, George Arthur, M.B., Ch.B., 1937 (Univ. Edinburgh), c.o. Royal Prince Alfred Hospital, Camperdown.

Langley, Russell Alfred, M.B., B.S., 1946 (Univ. Melbourne), 2A Victoria Road, Edgecliff.

Macleod, Isabella, M.B., Ch.B., 1925 (Univ. Edinburgh), c.o. Dr. R. E. Bosanquet, Panania.

Shepherd, Webster Graeme, 1945, M.R.C.S. (England), L.R.C.P. (London), 1945, H.M.A.S. *Kuttabul*, Sydney.

Obituary.

EDMOND CLARKE.

WE regret to announce the death of Dr. Edmond Clarke, which occurred on May 5, 1949, at Kilmore, Victoria.

HENRY ALEXANDER HAGEN.

WE regret to announce the death of Dr. Henry Alexander Hagen, which occurred on July 29, 1949, at Hampton, Victoria.

FREDERICK DAVID JERMYN.

WE regret to announce the death of Dr. Frederick David Jermyn, which occurred on July 30, 1949, at Woori Yallock, Victoria.

WILLIAM RODNEY CLARK.

WE regret to announce the death of Dr. William Rodney Clark, which occurred on August 7, 1949, at Malvern, South Australia.

WILLIAM HENRY HARBISON.

WE regret to announce the death of Dr. William Henry Harbison, which occurred on August 8, 1949, at Wallaroo, South Australia.

WILLIAM HORNER NELSON.

WE regret to announce the death of Dr. William Horner Nelson, which occurred on August 17, 1949, at Perth, Western Australia.

JOHN AUSTIN CAHILL.

WE regret to announce the death of Dr. John Austin Cahill, which occurred on August 13, 1949, at Melbourne.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Dunkley, Brian Hiatt, M.B., B.S., 1947 (Univ. Sydney), Ryde District Soldiers' Memorial Hospital, Eastwood.

The undermentioned has been elected as a member of the South Australian Branch of the British Medical Association:

Thomas, Alfred John Thornley, M.B., B.S., 1949 (Univ. Adelaide), 29 Warwick Avenue, Toorak Gardens, South Australia.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Brady, Peter Martin Carrol, M.B., B.S., 1947 (Univ. Sydney), Flat 6, 15 Lytton Street, North Sydney.

Currow, Elwin George, M.B., B.S., 1948 (Univ. Sydney), 12 Maitland Road, Cooranbong.

Mair, John Russell, M.B., B.S., 1948 (Univ. Sydney), Flat Number 3, 102 McPherson Street, Cremorne.

Tarn, Joseph Henry Teesdale, M.B., B.S., 1947 (Univ. Sydney), 4 Clifford Street, Gordon.

Witts, Fannie Eva, M.B., Ch.M., 1923 (Univ. Sydney), 21 Burns Road, Wahroonga.

Diary for the Month.

SEPT. 1.—New South Wales Branch, B.M.A.: Special Groups Committee.
SEPT. 1.—South Australian Branch, B.M.A.: Council Meeting.
SEPT. 2.—Queensland Branch, B.M.A.: Branch Meeting.
SEPT. 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 7.—Victorian Branch, B.M.A.: Branch Meeting.
SEPT. 7.—Western Australian Branch, B.M.A.: Council Meeting.
SEPT. 9.—Queensland Branch, B.M.A.: Council Meeting.
SEPT. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
SEPT. 15.—Victorian Branch, B.M.A.: Organization Subcommittee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135 Macquarie Street, Sydney): Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester United Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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